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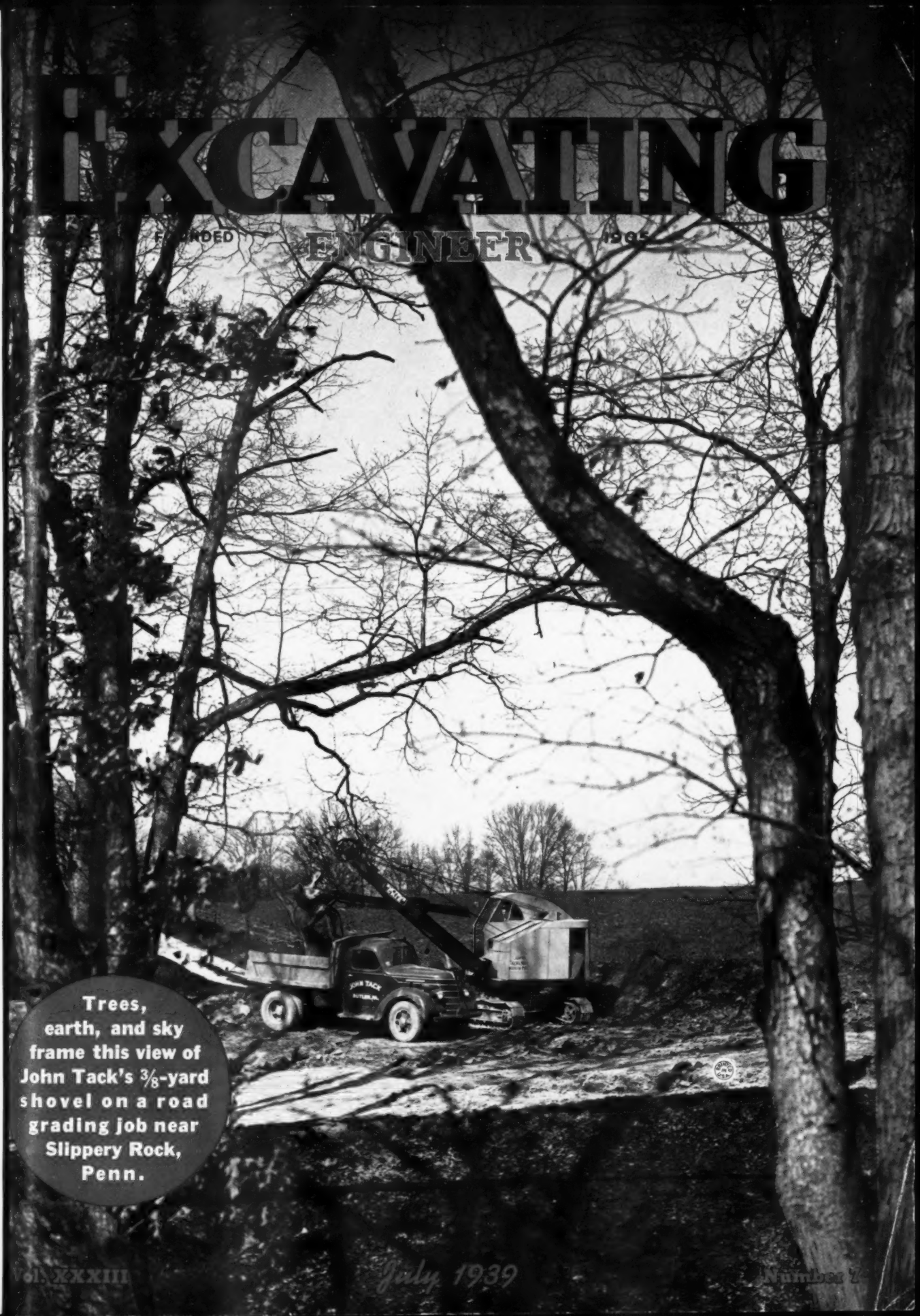

Trees, earth, and sky frame this view of John Tack's 3/8-yard shovel on a road grading job near Slippery Rock, Penn.

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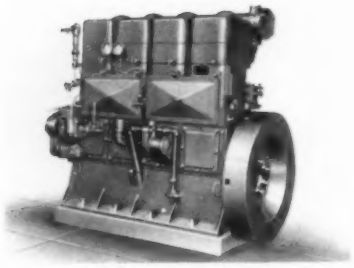
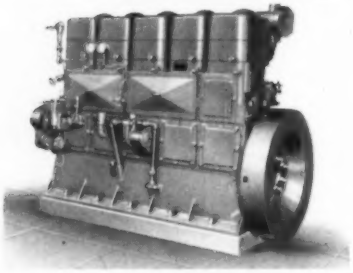
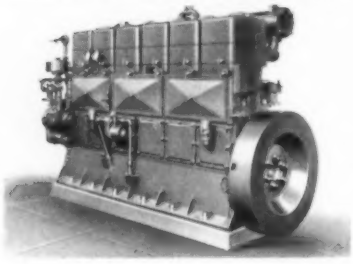


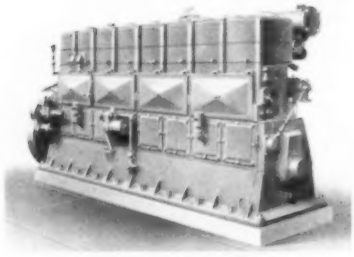
4 Cylinder Model
135 Horsepower



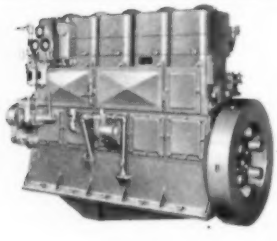
5 Cylinder Model
165 Horsepower



6 Cylinder Model
200 Horsepower



8 Cylinder Model
275 Horsepower



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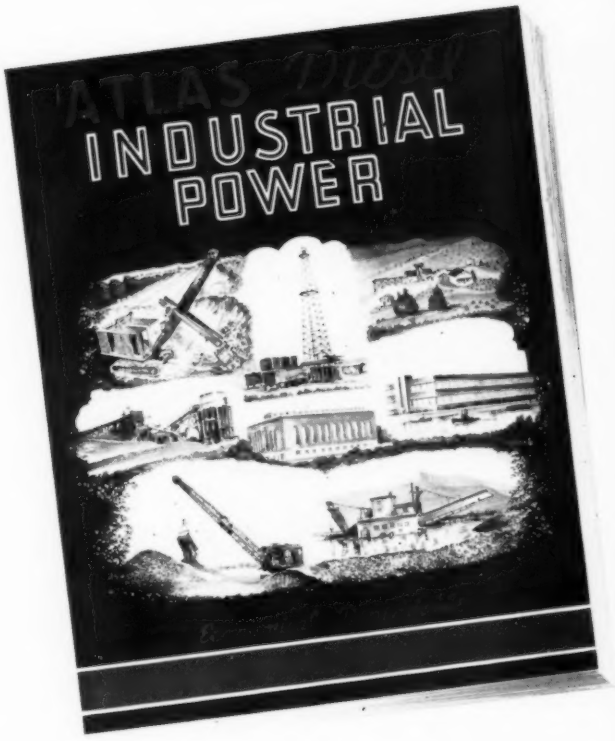
available in 4, 5,
6 and 8 Cylinders



This new catalog, just off the press, illustrates and describes the component parts of the enclosed type Atlas Diesel, including both stationary and industrial models.

These engines are all of 9″ bore and 10½″ stroke and turn at 514 R. P. M. They are built in 4, 5, 6 and 8 cylinder models, with all parts except those affecting the length of the engine interchangeable.

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ATLAS Imperial DIESEL ENGINES

EXCAVATING ENGINEER

FOUNDED 1905

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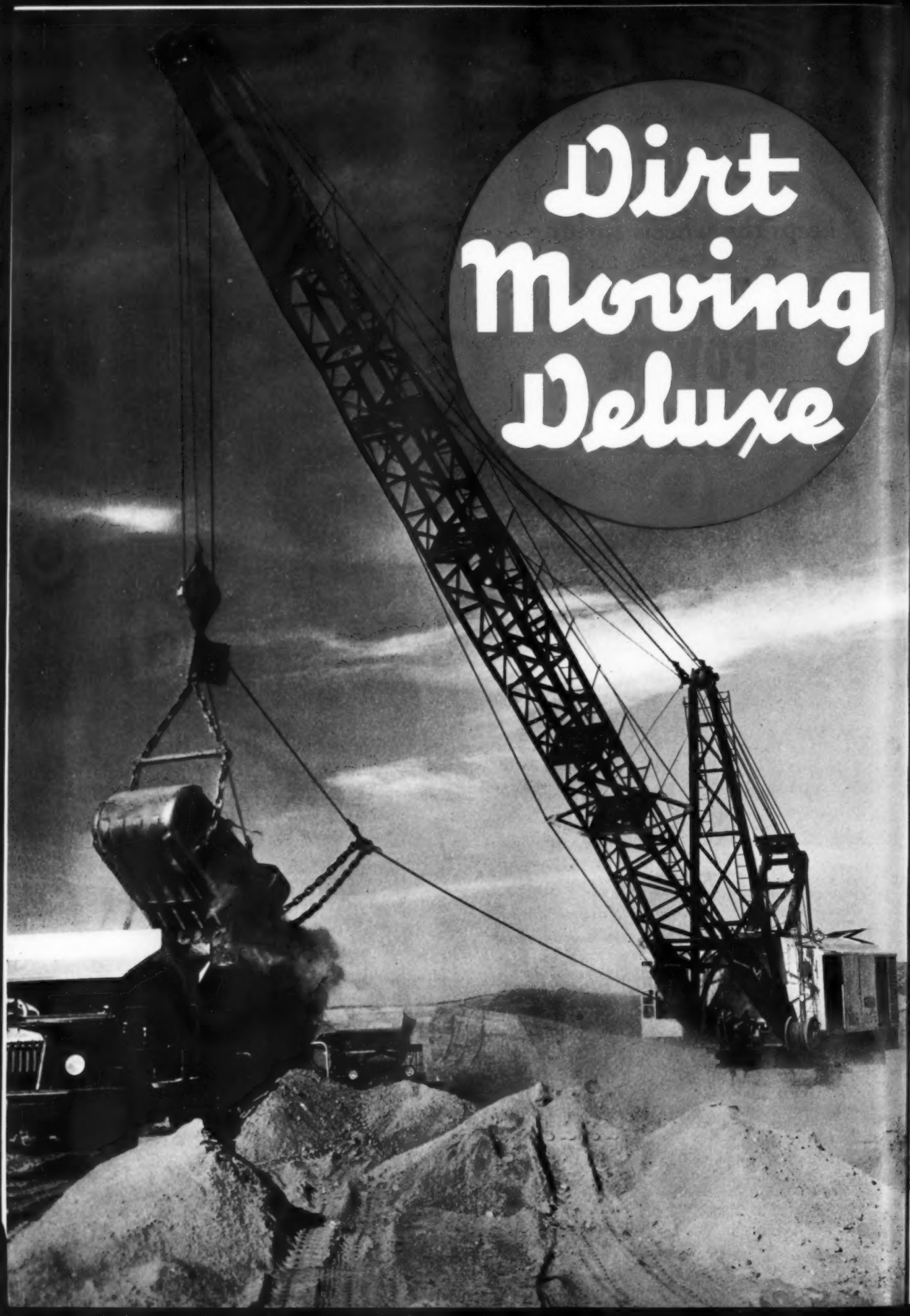

Dirt
Moving
Deluxe

AT HANSEN DAM

Guy F. Atkinson Company sets the pace for large-scale earth moving operations by its use of modern, heavy duty machines on this part of California's $70,000,000 flood control program.

By
OWEN H. BARNHILL
JOHN R. MARCY

IF YOU haven't seen large-scale earthmoving operations within the last year you simply haven't seen earthmoving. Yardage capacities of mobile equipment is finally catching up with big capacity shovels and power units with a result that is not only amazing as to quantities handled, but has also made that handling profitable at low prices.

Among the first to utilize these recent equipment advantages was the Guy F. Atkinson Company of San Francisco, contractors for the Hansen Dam, large earthfill embankment being built across Tujunga Wash., 20 miles north of Los Angeles, California.

Key Unit of Flood Control Program

This dam is the key unit of the $70,000,000 flood control program being carried out in Los Angeles and Orange Counties by government engineers. It is being financed by Federal funds as authorized by the Flood Control act of June 22, 1938. United States Army engineers designed the dam and are also supervising its construction.

Bids were opened August 8, 1938, and the job was awarded to the Atkinson Co. for $5,688,419. Work was started the following month and is to be finished by March 12, 1941.

Briefly described, the structure is a retarding dam 100 feet high, 9,050 feet long, 1,000 feet wide at the base, with 3:1 upstream slopes. Outlet gates and spillway will be constructed about midway across the dam. As illustrated in the accompanying diagram, the fill will be placed in five zones, the three upstream of compacted impervious material, and the two downstream of uncompacted pervious fill.

Earth for the embankment is excavated from borrow pits 1000 to 9000 feet upstream. This material ranges from loose rocks and gravel, at the center of the wash, to sandy clay at the west side, where part of an orange orchard was cleared away for a borrow pit site.

The coarsest, loosest material is dumped on the lower side of the dam, zone 5, and slightly finer material next to it, zone 4. The most impervious material, yellow clay is placed in the center of the dam, zone 2, and somewhat more pervious earth goes into zones 1 and 3, on either side. A half-million yards of material considered unsuitable has been hauled to waste below the dam. Part or all of this earth may be used to build up berms or fills below the embankment.

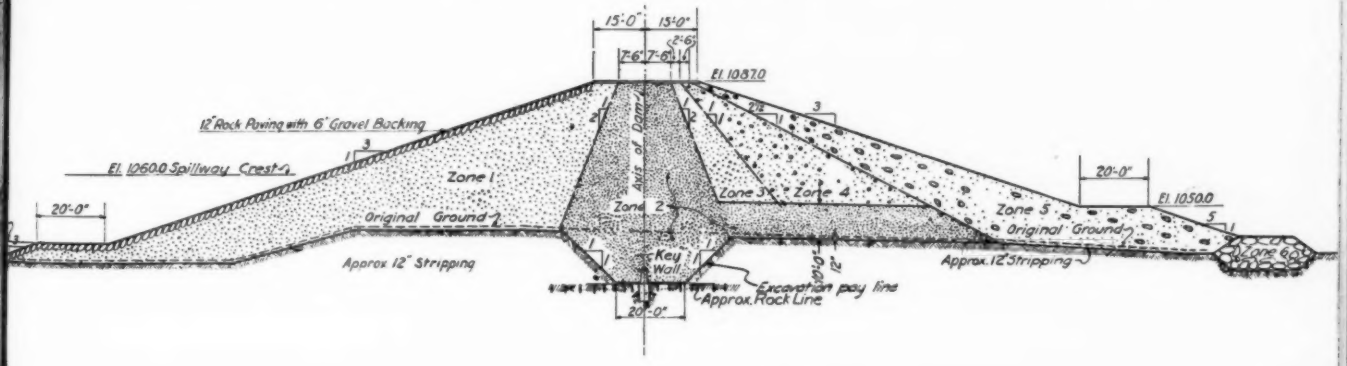
The estimated yardage in each zone is as follows: 1st and 3rd, 4,840,000; 2nd, 2,650,000; 4th, 1,998,000; 5th, 3,420,000.

To date, work has been chiefly confined to the construction of the outlet works and the western half of the embankment.

Levelling Hansen Knob

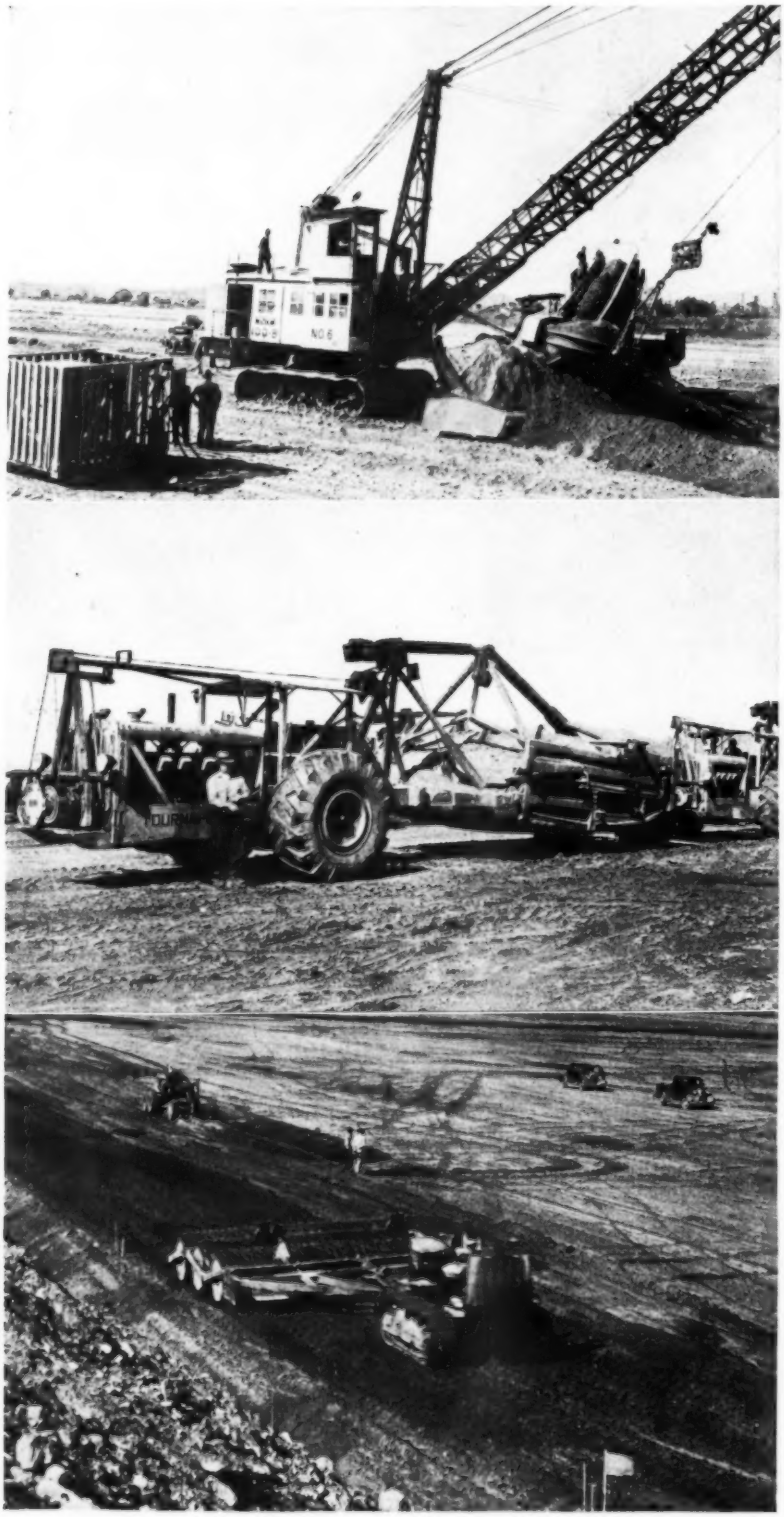
At the site of the outlet works a hill about 100 feet high called Hansen Knob originally stood, and one of the first operations was to level this eminence. You don't see many steam-powered shovels in modern heavy construction, but two veteran steamers, Bucyrus-Erie 50-B's, swung into action here and handled the entire job.

It has been pointed out at the



● **Prepared by the United States Army Engineers, this sketch shows the five zones of fill on a typical cross section of Hansen Dam.**

● Top: A newcomer to the dirt moving business is this Dragveyor built around a Bucyrus-Erie 120-B dragline. Note cab extension built on regular cab roof. Center: A fleet of thirteen 24-yard Tournapulls of this type handled large yardages at Hansen Dam. Bottom: Rolling the center fill with a 3-unit sheepsfoot roller.



beginning of this article that yardage capacities of mobile equipment have been greatly increased on Hansen Dam. A fleet of 10 new Sterling Diesel 16-yard trucks is one feature of this. Such a fleet can handle a huge amount of material if kept rolling, and it is interesting to note that the two old-timers did keep them rolling.

Purchased by the Atkinson Company in 1932 during the construction of the San Gabriel road, these two shovels have been in constant use ever since and are still strong and vigorous. Their activity did not by any means stop with the hill job. One of them was later sent up to the quarry, where it has handled all the rock being placed in the downstream toe and the spillway—and handling rock weighing up to 5 tons is far from light work. The other handles the rock at the dam. Operators Rice at the quarry and Henry La Brie at the dam are agreed that their respective machines are not only still efficient rigs, but as the latter says, "absolutely the best equipment for handling rock."

Before making the fill, the site is stripped one foot deep, scarified, moistened, and packed. Next a cutoff trench 20 feet deep and wide, with 1.1 sloping sides is excavated, filled and tamped, and then the five zones of the embankment built up evenly.

Introduction of Dragveyor

Material for zones 4 and 5 consisting of gravel and rock is all loaded with dragline and shovel and hauled by truck. A new device was used here for the first time with the 100-B electric Bucyrus-Erie dragline which is said to increase handling capacity greatly. This device, called a Dragveyor, was developed and manufactured by Garlinghouse Bros., of Los Angeles.

In order to load the Dragveyor, the fairlead of the 100-B was raised 6 feet; controls and pedals, 8 feet. From a small pilot house atop the right front corner of the cab the operator is able to see over the pile of material which covers the lower end of the conveyor. The dragline, equipped with an 8-yard Sauerman bottomless bucket, brings material out of the pit onto the conveyor.

The Dragveyor is skid mounted and powered with a 75 h.p. variable speed, slip ring AC electric motor. Material is conveyed by a 60-inch belt passing over closely spaced rollers turning on Timken bearings, to a height of 20 feet. This elevation is greater than needed for loading trucks, but the device may also be used for dumping rocks onto a grizzly. An operator stands at the outer end of the conveyor and controls the loading of the 16-yard trucks.

"Double-spotting" with the Dragline

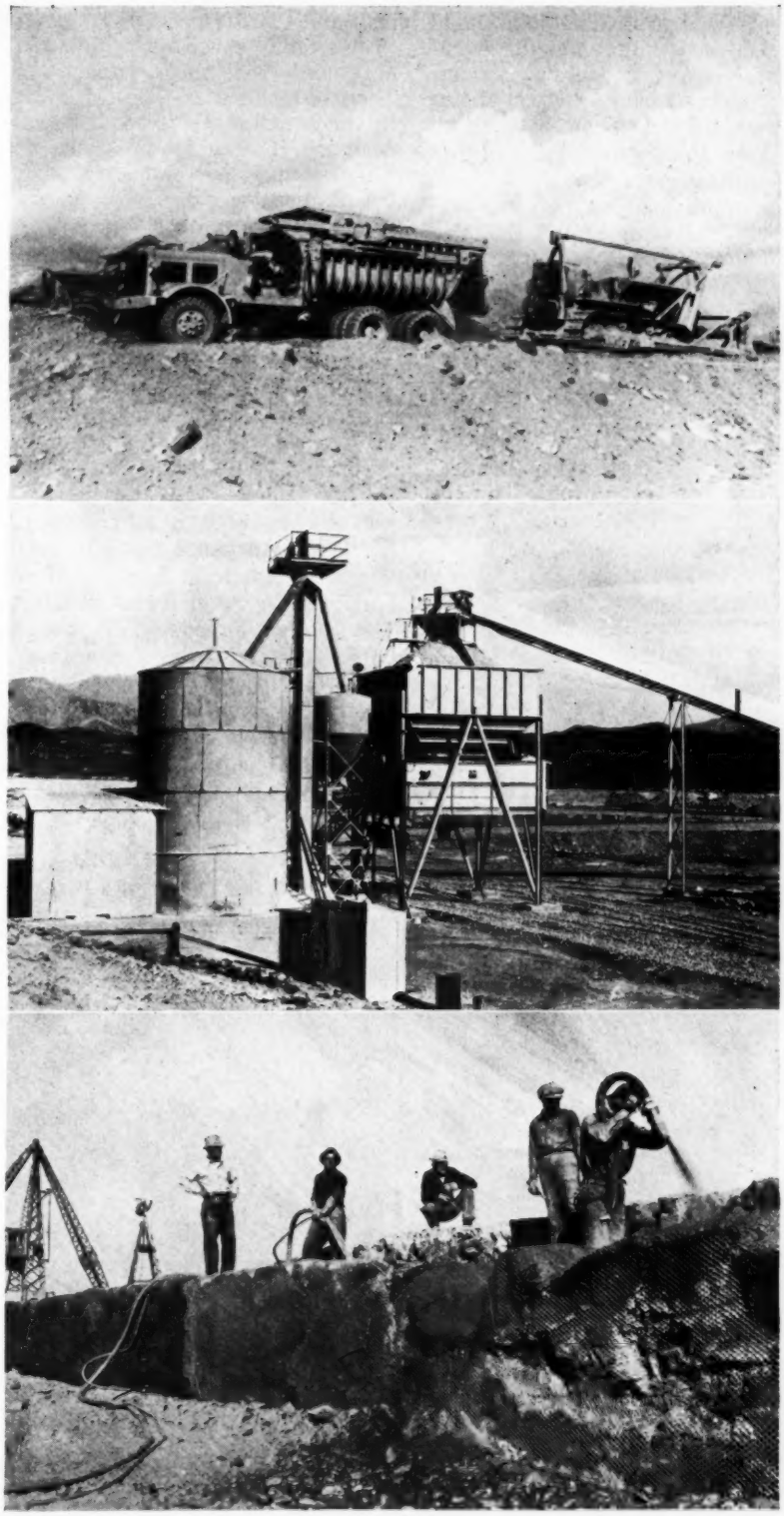
At present, the 100-B dragline is employed on a deep excavation for the spillway, and a 120-B Bucyrus-Erie shovel is loading the trucks at the borrow, the Dragveyor not being in use. The 120-B is equipped with a 5-yard bucket, and is giving a remarkable performance. It tears at a gravel bank some 20 feet high. A big 16-yard truck rolls up to the right side of the shovel. Three scoops of the big dipper heaped with 5 yards of loose gravel, and the truck is loaded. Another truck, meanwhile, has dashed up into position on the other side, and the shovel swings and fills it. There is scarcely a pause, and the stream of trucks is continuous.

This coarse material is dumped on the downstream side of the fill and leveled in 4-foot layers with bulldozers. While not compacted with tampers, it is consolidated by flushing with water through a sprinkling system.

Large Capacity Scrapers Used

They're moving dirt with the new Tournapull carryalls, too. 13 of these are being used commercially for the first time on the dam. These 24-yard scrapers represent some radical changes in equipment design. They are similar to LeTourneau carryalls, but have larger wheels with huge tires 7 feet high designed specially for this equipment.

The tractor which pulls the scraper is supported by a single pair of wheels of the same size, the 160 h.p. V-8 Caterpillar Diesel engine overhanging the axle in front, its weight balanced by the scraper behind, to which it is fas-



● Top: A 42-yard Trojan diesel truck dumps fill for a waiting bulldozer on zone 5. Center: This modern batching plant provided concrete for the dam. Bottom: Spraying a spillway ledge with its first coat of concrete. Three 1-inch coats were applied to the stone fill which was first covered with 1-inch poultry netting.

tened by two flexible joints. The wheels are high enough to roll rapidly over moderately rough terrain, steering control being given by independent wheel drive.

Two Caterpillar tractors furnish the necessary power for loading, one pushing against the Tournapull from behind, the other pulling in front. The scrapers load going into the borrowpit, filling on the downhill push-pull. Impervious material for zones 1, 2, and 3 is handled by the scrapers. The pay load runs from 15 to 17 yards per load.

Dumped on the fill, this material is first bladed with Auto Patrol graders, sprinkled by two Sterling sprinkler trucks, scarified, and then tamped. Eight and twelve unit sheepsfoot tampers are used for the compaction. These tampers were mostly built in the contractor's shop and are designed to exert a pressure of 1,100 pounds per lineal foot of tread when weighted with water. Eight rollings of each 6-inch layer are included in the contract price, with extra pay for each additional rolling, of which seven are now being given, making a total of fifteen.

Moisture content of the material is brought up to about 10% at the borrow pit by sprinkling through 4-inch twist welded pipe supplied by Calco. Water at irrigation rates is obtained from the city of Los Angeles, inside whose limits the dam is located. This water comes from Owen's Valley through an aqueduct 250 miles long. Winter rains sometimes make artificial wetting unnecessary, and have sometimes interfered with excavation and moving.

On the downstream side of the embankment a rock toe is being constructed next to zone 5. A trench 25 feet wide and 10 feet deep was excavated the entire length of the embankment by the 100-B dragline, and this is to be filled with rocks graded in size from 75 to 1,000 pounds each. The placing of this rock has not yet begun.

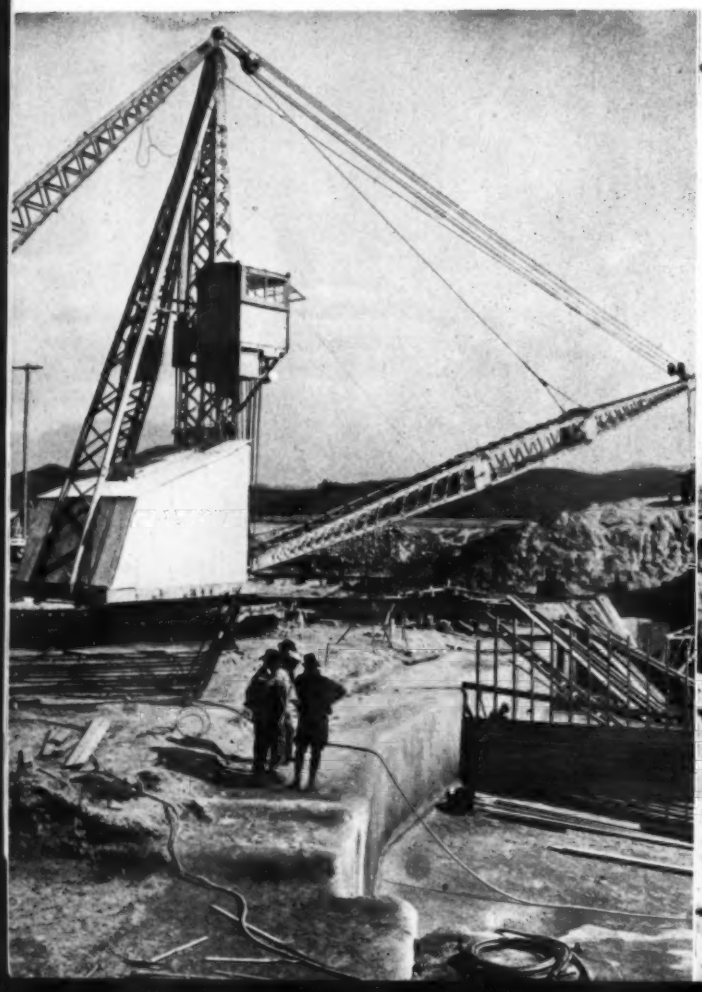
Upper Face Construction

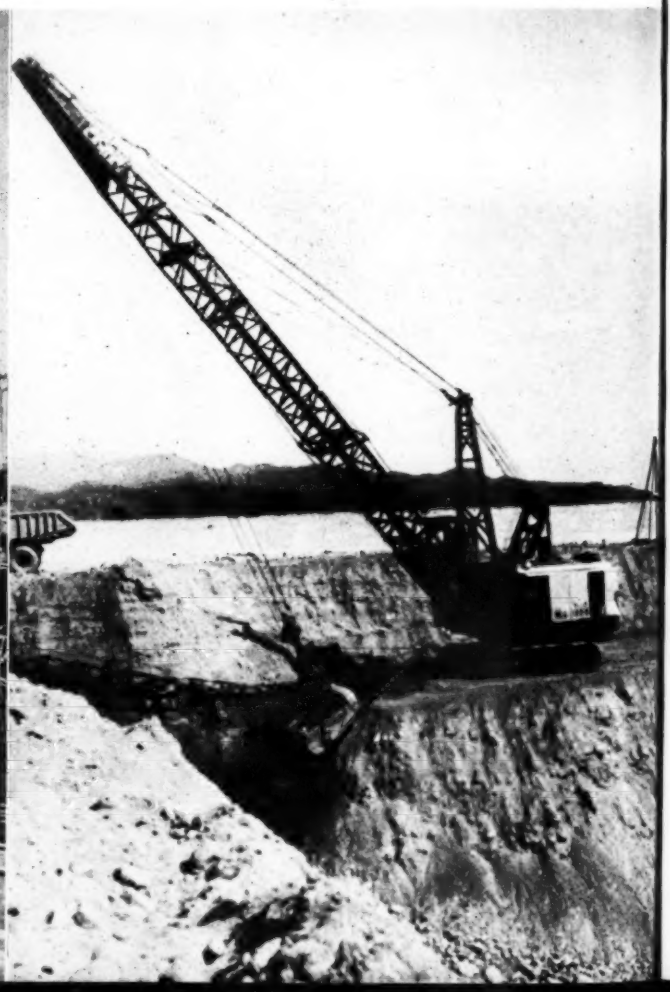
The upper face of the dam will be paved with a 12-inch layer of angular one-man rocks, each weighing 75 pounds or more. Nearly 3 million cubic feet of stone will be required for this paving, which is to be laid for $16 per 100 sq. ft. The rocks will be hand placed and held in position with tightly driven spalls, the whole supported by a 6-inch layer of smaller material.

Granite and other stone for the dam is being quarried in a small side canyon of the Little Tujunga, some 6 miles above the dam. Compressed air for drilling is furnished by a 120 h.p. Diesel engine and compressor. Both machines are installed on concrete bases in

(Continued on page 406)

● **Left: A section of the spillway site. Note the concrete lined ledge. One of the three "stiff-leg" electric hoists is in the background. Right: The same dragline used in the Dragveyor set-up is shown digging the spillway excavation.**





MINING BENTONITE

with two diesel draglines

Digging through a heavy overburden, the Domingos Construction Company mines Bentonite — a material invaluable in oil refining operations.

STRIPPING about three million yards of sandy clay overburden from a bentonite deposit, mining and loading the bentonite in trucks and hauling the material 18 miles to Morton, Mississippi is the man-sized contract that is keeping the Domingos Construction Company of Bainbridge, Georgia busy these days.

Since 1935 the Domingos Construction Company headed by A. B. Domingos, president and N. O. Parrish, secretary and treasurer, has handled the mining operations of this large bentonite deposit near Polkville, Mississippi for the Filtrol Corporation of Jackson, Mississippi. Mr. J. L. Crittenden is superintendent in charge of operations.

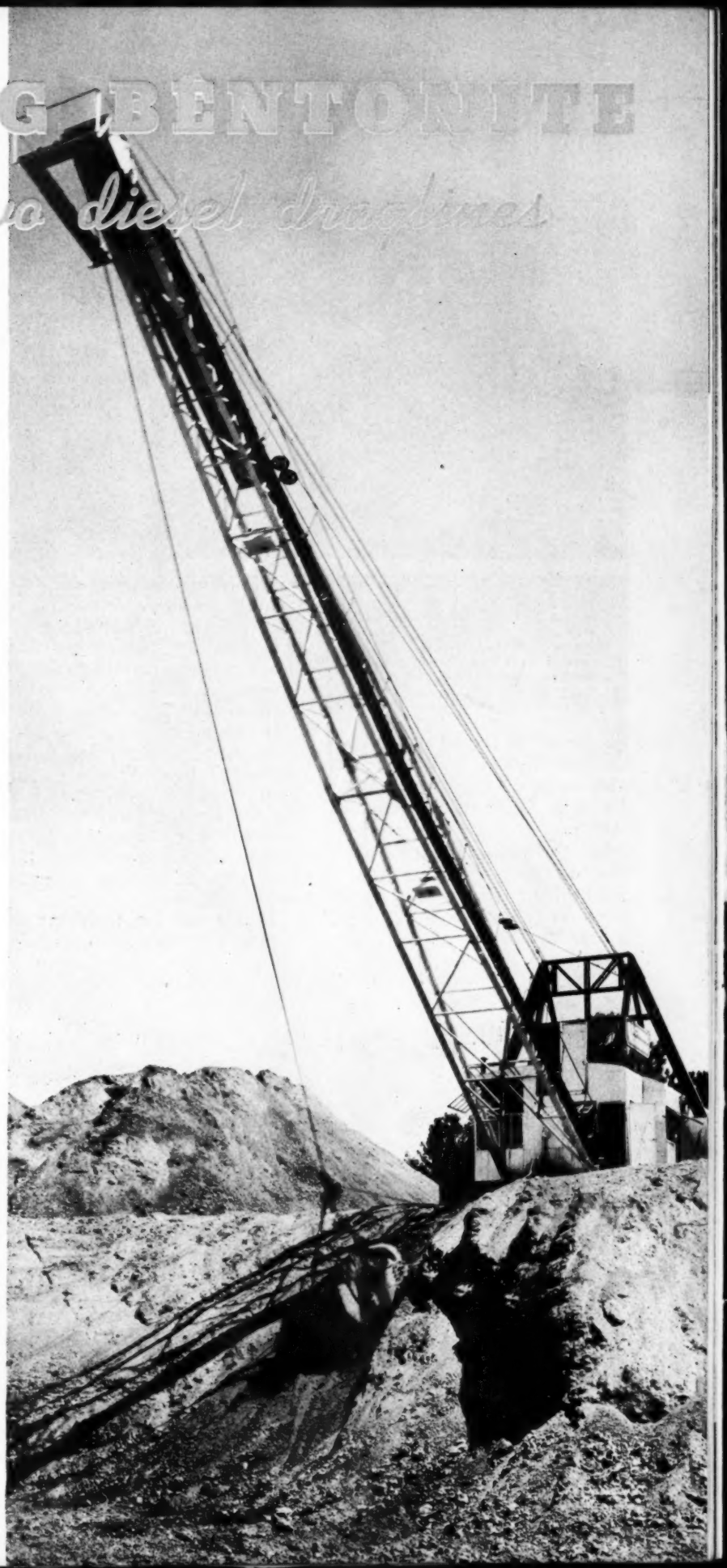
Bentonite Bed 30" Thick

Bentonite is a necessary ingredient used in oil refining operations. Believed to be the result of a volcanic ash deposit, the bentonite lies in a vein about 30 inches thick under a heavy overburden of sand and clay averaging about 16 feet in thickness.

Equipment performing this mining operation consists of a 5-W Bucyrus-Monighan diesel dragline, swinging a 3-yard Red Arch bucket on a 100 foot boom; a ⅜-yard 10-B Bucyrus-Erie diesel dragline, and a fleet of 12 Chevrolet trucks.

Moving the 5-W to the job location proved to be quite an interesting experience according to A. B. Domingos, company president.

"The 5-W was unloaded from railroad cars at Morton and had to be hauled 18 miles over sand and



L. Left: The 5-W strips the overburden from the bentonite bed with a 3-yard bucket. Right: After the overburden is removed this Bucyrus-Erie ⅜-yard dragline loads the bentonite to Chevrolet trucks.

clay roads to the mine. To transport the 89,000 pound center section we used a large trailer pulled by three Caterpillar 60 tractors. Although it was necessary to board the highway in some places and despite the fact that it snowed, the trip to the mine was made in two and one-half days," states Mr. Domingos.

Stripping the Overburden

With an average output of about 1,500 yards per 8-hour day, the 5-W dragline follows the bench method in stripping the overburden and working the bentonite deposit. The 5-W uses about 7 gallons of diesel fuel per hour.

As heavy overburden is removed by the 5-W the ⅜-yard 10-B follows up, digging and loading the bentonite on the trucks. Besides loading 300 tons of bentonite a day on trucks, the 10-B finds time to clean up after the larger 5-W.

The 30 inch layer of bentonite is carefully mined and any possible waste of the material is avoided. Large pockets of the bentonite are mined by the 10-B followed by hand shovel workers who carefully clean out the "odd corners" difficult to load by machine. As can be seen in the accompanying photograph, a large canvas is placed on the side of the cut be-

(Continued on page 408)

R. A general view of the mine showing the 5-W in the background removing the overburden to spoil bank while the 10-B (foreground) loads the bentonite. Note the drainage ditch on each side of the bentonite deposit.

DIGGING DITCHES
for flood prevention

Revision of about six miles of ditch work will save Lancaster, Ohio thousands of dollars by preventing flood damages.

THE REVISION of six miles of city ditch work for flood control purposes was just another job to the Bucyrus-Erie ½-yard gasoline, combination shovel, dragline, and clamshell that has been performing an all around "handy-man" job for the city of Lancaster, Ohio ever since it was purchased in April, 1938.

For some time Baldwin's Run, a small stream running north and south through the eastern section of Lancaster, has been periodically overflowing its banks during the rainy seasons causing thousands of dollars in flood damage to the citizens of Lancaster.

Six Mile Stream Revision

The six mile revision of Baldwin's Run was carried out under the supervision of A. F. Raab, Director of Public Service, Lancaster, Ohio. The completion of this revision is the latest accomplishment of the ½-yard gas combination shovel that has already handled a variety of jobs for the city such as removing top-soil from gravel banks, loading gravel, building streets, pulling down abandoned power line poles, loading abandoned street car rails, and dredging streams.

Charles Stockwell, who operated this dragline on this job was a former truck driver for the city of Lancaster. The accomanying illustrations will testify to the

(Continued on page 418)

Top: Mr. F. Raab, Director of Public Service, supervised the work and Charles Stockwell operated the ½-yard dragline. Center: Baldwin's Run before the revision. Heavily eroded banks offered little resistance to flood waters. Bottom: [illegible]

EXCAVATING ENGINEER

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Devoted to the Excavating Industry

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Construction Contracts Highest Since 1931

Construction contracts awarded during April rose to an eight-year peak. Not since 1931 has the April volume of construction equaled the total figure for April, 1939. Total building and engineering awards for the month in the 37 Eastern States amounted to $330,030,000. This represents a gain of 49 per cent over the April, 1938 total and an increase of 10 per cent over the record for March, 1939.

Commenting on the April record, Thomas S. Holden, vice-president in charge of the Statistical Research Division of F. W. Dodge Corporation, stated that the current rate of contract-letting is approximately at the 1931 level. "April contracts brought the cumulative total for the first four months of this year to $1,102,561,000, as compared with $760,110,000 for the corresponding period of last year, representing an increase of 45 per cent. This is the largest total for any like period since 1931 when the corresponding figure amounted to $1,170,267,000."

A significant feature of the four-months' construction record for this year, according to Mr. Holden, was the performance of non-residential building, in which every important class showed a larger total for the elapsed period of 1939 than for the corresponding 1938 period. The most important gains over last year occurred in educational and science buildings, amounting to $29,881,000 or 42 per cent; public buildings gained $12,595,000 or 50 per cent; hospitals and institutions gained $10,615,000 or 34 per cent, and manufacturing buildings increased $8,383,000 or 22 per cent. This gain in manufacturing building expenditures occurred in spite of a declining trend in the indices of general business.

Total non-residential building for the first four months of this year amounted to $346,985,000, the largest figure for a comparable period since 1931, with the exception of 1937 when the early months were influenced by speculative expansion. Compared with the first four months of last year, the 1939 total shows a gain of 26 per cent.

Business System Editorials

The editorial "Add Up the Score" which appears on the next page is the last in a series of twelve editorials based on bulletins issued by the S. D. Warren Company in clear, simple explanation of the American business system.

These editorials were published because EXCAVATING ENGINEER believes that they give an extremely clear picture of the American business system in an understandable manner free from the complexities that cloud the usual business system discussion.

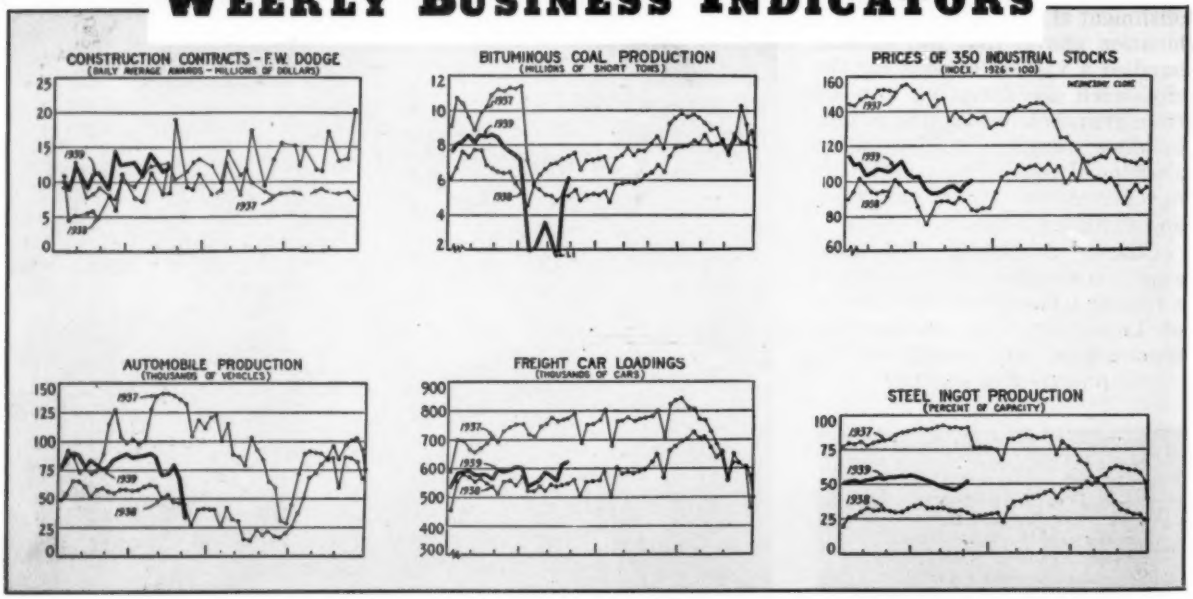
The twelve editorials which we have published are:

Who Are Business Men?
Building a Business
When A Business Grows
Who Puts Up the Money?
Who Owns Business?
Should Business be Big or Little?
Who Pays the Taxes?
Who Determines the Wages of Employees?
What Is Management?
The Competitive System
Good Times and Bad Times
Add Up the Score

Reprints of these editorials are available to those interested at one cent per copy in lots of ten. Orders for ten copies of a single reprint are the smallest we can handle. If you desire to have the whole series, send $1.20 and we will forward ten copies each of the twelve editorials listed above.

These reprints are offered at cost for the purpose of distribution to friends or employees. Orders should be addressed to EXCAVATING ENGINEER, South Milwaukee, Wisconsin.

Weekly Business Indicators



ADD UP THE SCORE

ONE THOUSAND, nine hundred, and thirty-eight years have passed since the birth of Christ, and in all that time the world has not produced another perfect man.

Most of the people in the world are pretty good people, when you get to know them, but none of them are perfect. Some of them are not as thrifty as they ought to be, and others are too thrifty; some of them get excited too quickly, and others don't get excited as quickly as they should; some of them are not very smart, and others are too smart. **And every man makes some mistakes.**

Obviously, if there are no perfect people, there cannot be any perfect society — because a society is only what its people make it. So the problem of all people is to do the best they can, with imperfect material, to develop a reasonably good society and government. The two systems of society and government that are most generally in use today are the "paternalistic" system, and the "democratic" or "competitive" system.

The paternalistic system is based on the effort of one imperfect man (or a small group of imperfect men) to combine millions of imperfect people into a perfect society; Russia, Germany, and Italy now have this kind of a system.

The competitive democratic system is founded on the belief that because there are no perfect men, no man is qualified to hold complete control over the lives of the people of a nation. The United States was founded on this belief.

The paternalistic system of society has some advantages and some disadvantages. The man who runs such a society can get things done quickly, because he doesn't have to argue with anybody. He can make reforms effective quickly, merely by announcing new rules.

The disadvantage of the paternalistic system of government is that the man who runs it dares not permit any one to disagree with his views. It is impossible for one man (or one group of men) to rearrange all of the complicated affairs of a nation unless he can force everybody to do exactly as he orders them to do, and so when people disagree with his wishes, he must order them to do as they are told. If they refuse, he must take control of their affairs, so that he can fit those affairs into his general plan.

In the countries that apply the paternalistic system, the rulers have been forced to take control of every activity. First, they had to take control of the industries of their countries to adjust each industry to all other industries. When the governments took over the industries, all of the employees worked for the governments, and so the governments had to take control of employees to prevent them from disagreeing with their new employers. Then, in order to use labor to the best advantage, the governments had to dictate what kind of a job each worker should take and keep, and how much he should be paid. The governments also had to take over control of the farms and farmers, in order to balance the various crops, and the use of those crops.

Thus the paternalistic system of government has brought, and must bring, all of the people of a nation completely under the power of one man (or one group of men) who must force all of them to give up their individual personal rights and to submit to orders regarding their personal actions, thoughts, and expressions. That one man may be a good man, but he is merely human, and he can make mistakes. And he may be a bad man. In either case, he must grant great powers to hundreds of thousands of assistants who, at best, are only ordinary people who can be selfish and who can make mistakes; but who may, in some instances, use the absolute power of government to rob those who are helpless, and to persecute those who complain.

The competitive democratic system of society, as it has been applied in America, is comparatively cumbersome. It gets things done slowly, and permits considerable inefficiency. It allows some opportunity for hunger and injustice while business leaders and statesmen seek means for improvement. Yet it gives all men and women the freedom to say what they please, to work where they please, when jobs are available, to go into business for themselves if they wish, and to do all of these things without fear of political persecution, concentration camps, or firing squads.

And with all of its imperfections, the competitive democratic American system has given the employees of America more necessities and more luxuries, then are enjoyed by the people of any other nation in the world.

THE SCORE

130 million Americans receive more wages each year than the 550 million people who live in Europe.

With 18 minutes of work, an American steel worker can earn food that an English steel worker must work 76 minutes to earn, that a German must work 120 minutes to earn, and that a Belgian must work 236 minutes to earn.

The United States owns 178 radios for every 1,000 people, Germany has 108, Russia has 17, and Italy has only 2 radios for every 1,000 people.

America has enough automobiles to carry the entire 130 million population at one time. Actually, America has one automobile for every 4½ people, England has one automobile for every 20 people, Germany has one automobile for every 49 people, and Russia has one automobile for every 479 people.

The average American wage is twice the average British wage, three times the German wage, and five times the Italian wage. And a dollar of the American wage will buy more and better conveniences than a dollar will buy in Europe.

When the score is added up, it is apparent that the imperfect, democratic, competitive system that exists in the United States has given the American people definite advantages that are not enjoyed by the citizens of the paternalistic governments.

Mr. Brady Objects

Dear Sir:

You brought this on yourself by your statement in your March issue. Several times since you have been publishing Business Bulletins in Excavating Engineer I have felt the urge to write and tell you "so what" just as Mr. J. E. Frost has done (see page 150, March Excavating Engineer), hesitating because I'm only "small fry" having been a more or less indifferent shovel operator for the past 25 years. After reading Mr. Frost's letter I find that at least some men in Industry are directing their thinking along lines that are most likely to lead to a solution of the problems that bother both Big Business and small fry.

"When are we going to learn that Money--INTEREST FREE MONEY--is what we need?" When enough of the people in high and low places realize that though the material wealth of the Nation has increased by leaps and bounds there has been no interest free money issued since the end of the Civil War when we were little removed from ruralism. If this condition had been intended by our Forefathers then why in Hell did they bother to write Article 1 Section 8 paragraph 5 into the Constitution?

When we get down to brass tacks, there is little difference between the Farmer, the Worker, and the Industrialist in so far as the Government is concerned. All are a part of the whole and any form of Government must have the support of all else it will fall. This being so, Government credit is nothing more or less than the credit of men like yourself, Mr. Frost and, of course, me, so how come that in addition to taxes we are required to pay interest for the use of our own credit?

If, as you state on your editorial page, that you are publishing these business articles "because they give an extremely clear picture of the American Business System" then it is not surprising that American Business and with it everything American is headed for the rocks.

In your March issue you publish "Who Determines the Wages?" Is this a frank confession that American Business does not know what is wrong? Or is it a thinly veiled suggestion that if we all accept lower wages, every one will have a job and we can all be happy?

If business should put to work every available person at as high a rate of pay as is possible under the present set-up there would be absolutely no improvement in our general condition. We can establish a minimum yearly income as an American standard. If this were high enough to enable the wage earner to purchase all the gadgets produced by industry in the past 25 years, industry could not pay it. On the other hand, if such a yearly rate did not provide for the purchase of all these things, industry could not dispose of its products and we would be right back to where we are now.

I wish I had an old steam ERIE and a million yards of good stiff digging, nothing would bother me then but lack of trucks.

Very truly yours,
for more and better shovels,
Leo F. Brady

Mr. Brady's opinions, as expressed in the letter above, reflect a certain amount of straightforward thinking and, although Excavating Engineer does not entirely agree with him, we are happy to publish his somewhat provocative letter.

Mr. Brady has seconded Mr. Frost in the query —"When are we going to learn that money—INTEREST FREE MONEY—is what we need?" We wonder if these two gentlemen have any money they would care to lend out interest free? We think not. Money represents savings, lending it involves a service expense and a risk. Besides, unless it earns a return for us why should any of us bother to invest it?

Banks today have more money available for loans, and at a lower rate of interest, than they have ever had in the past. So this factor of interest is evidently not the cause of our economic ills. It seems to us that what we need is not free money but the opportunity to use what money we have, and the money available to us by use of our credit, with a reasonable chance for profit.

Although Mr. Brady terms himself "small fry" he continues by pointing out that whatever class we fall in we are important in the make up of our government. This is a healthy attitude and if more people thought, AND BECAME ACTIVE, along these lines it would be a decided step toward the solution of some of our economic ills.

As we have stated before no single group is all powerful in controlling our economic destiny. In the long run it is the mental attitude of the people as a whole that shapes the economic course of our nation. We grant that there are often temporary injustices and economic ills that seem needless. However, to adapt an old adage, we must remember that the mills of public opinion grind slowly but very thoroughly.

As to the "Who Determines the Wages?" question that Mr. Brady raises—"Is this a frank confession that American Business does not know what is wrong? Or is it a thinly veiled suggestion that if we all accept lower wages, everyone will have a job and we can all be happy?"

American Business is the first to feel economic pains and readily recognizes the cause of them. However, as stated above, it does not have ultimate control of these causes. In answer to Mr. Brady's second question regarding lower wages, we're afraid he missed our point as the editorial "Who Determines the Wages?" was intended to give a clear picture of the way in which the law of supply and demand, and not American Business, governs wages. We would like to point out here that a low wage with a large buying power per dollar can be equal to a high wage with a small per dollar buying power.

We thank Mr. Brady for his letter and hope that any of you who wish to make further comments will send them in. It's open discussions like these that will bring us closer to a true Utopia, if such a thing is possible.

— The Editor

Colonel Joseph Seward Ruston

ON May 2, leaders of industry and commerce in Lincoln, England joined shop workmen in paying tribute to Colonel Joseph Seward Ruston, chairman of Ruston and Hornsby Pty., Ltd., (builders of gasoline and diesel engines, pumps and other heavy machinery) and vice-chairman of Ruston-Bucyrus Ltd., (manufacturers of excavating and drilling equipment).

Beloved by all who knew him, Colonel Ruston died, after a sudden illness, at his London, England home on April 28th at the age of 69.

Born on August 1, 1869, at Washingborough near Lincoln, England, Colonel Ruston was destined to become a prominent leader in the industrial life of Lincoln because of his keen mind, his sympathetic understanding of human nature, and his foresight in industrial affairs.

Although he qualified as a barrister soon after leaving school Colonel Ruston never practised the profession. Instead he evidenced an early interest in industrial affairs and at the age of 27 was elected to a seat on the Board of Ruston, Proctor and Co., predecessors of the present Ruston and Hornsby Pty., Ltd.

In 1901, five years later, Colonel Ruston became chairman of his firm, a position he held until the time of his death. During the 42 year span of his service to Ruston and Hornsby, Colonel Ruston saw his company double in size.

Colonel Ruston was also active in a number of interests outside of his industrial world. During the South African war he held the rank of Captain and commanded a Volunteer Service company attached to the 2nd Battalion in the Lincolnshire regiment. At the time of the World War he held the rank of Lieutenant-Colonel and was on the depot staff of the Lincolnshire regiment.

Although his very active life led him along many paths to great responsibilities, Colonel Ruston always retained a close association with the city of Lincoln. Another of his unselfish works was his activity in the typhoid epidemic that broke out in 1905. With the aid of a friend an emergency staff of 50 nurses and doctors was employed and their courageous efforts did much to check the epidemic around Lincoln.

His most cherished possession was a hand-illuminated message of appreciation presented to him by the employees of Ruston, Proctor and Co., for his efforts during the typhoid epidemic.

It was only natural for a man of his energy and talents to take a keen interest in politics. Colonel Ruston was a prominent member of the Lincoln Unionist Association and became chairman of that group in 1913. He also filled various official capacities of such organizations as the: Gainsborough Conservative Association, Lincoln County Hospital, Mid-Lincolnshire Branch of the N.S.P.C.C. of Lincoln City F. C., and Agricultural Engineers Association.

In November, 1934, Colonel Ruston made a trip to the United States to visit his American associates at the Bucyrus-Erie Company. At that time those who met him were charmed by his friendly cordiality, his sincere, natural modesty, and his keen sense of humor.

The Colonel was married in September, 1909, to Muriel Amy Curle, and is survived by his wife, a son, and a daughter.

Equipment

you ought to KNOW ABOUT

Wet Battery for Hammer

A new cable assembly, which makes possible the operation of its portable gasoline hammer with wet battery as well as dry battery, is the latest development of Barco Manufacturing Company, Chicago, Illinois. The advantages of wet battery operation, according to the manufacturer, are increased efficiency and economy, particularly on continuous hammer operations over a long period of time.

Because it was necessary to keep the spark coil close to the hammer in order to insure the necessary quality of spark, the spark coil was placed in a streamlined water-tight container attached to the hammer by five feet of cable. According to the manufacturer, this container with the coil is so light it is not noticeable in the handling of the hammer. Owners of dry battery models of the Barco Hammer can easily change them over for wet battery operation in the field, it is claimed.

Bucyrus-Erie 2 Yd. Shovel

A new 2 cu. yd. power shovel, the 44-B, is being offered to the excavating industry by Bucyrus-Erie Company, South Milwaukee, Wis. This new machine is available with gasoline, diesel, or electric power and can be converted for use as shovel, dragline, clamshell, or crane.

An outstanding, new type chain crowd has been incorporated into the new 44-B. According to the

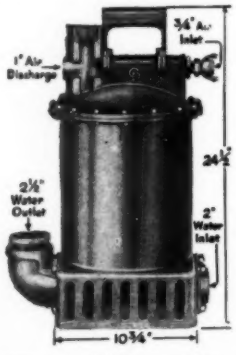
manufacturer, the new crowd will provide powerful crowd-out and high speed retract, saving time on every digging cycle. Crowd, hoist, and swing are synchronized to give maximum output in all kinds of digging. A light, strong front end affords the user exceptionally wide working ranges; and big sheaves increase rope life and provide favorable digging angles.

The manufacturer has given special attention to the dipper. A short back, curved door, and smooth inside which flares outward to the bottom all assure fast, clean dumping action. The 44-B dipper will handle oversize easily; and due to the dipper's welded alloy steel construction, the owner can be certain of getting topnotch service under the most severe digging conditions. The dipper is equipped with the famous inserted Beco Tiger Teeth made of tough, forged tool steel, which are both reversible and replaceable.

Readers interested in a machine of the 2 cu. yd. class should write Bucyrus - Erie Company, South Milwaukee, Wis. for a copy of the new 44-B bulletin.

Air-Operated Sludge Pump

A new portable air-operated sludge pump has been developed by the Chicago Pneumatic Tool Company, Chicago, Illinois. This sludge pump works on the ejector principle. Compressed air flows through the air inlet creating



a vacuum which sucks water through the inlet until a float valve in the drum shuts off the air discharge. The air is then forced into the drum instead of out the air discharge, and the pressure thus created forces the water out of the water discharge giving a pulsating flow much the same as a handpump. The pump can be applied to coffer dams, caissons, sumps, pits, construction jobs, etc.

Underbody Blade on FWD

A new Model HG, equipped with underbody blade and incorporating many improvements, was recently announced by The Four Wheel Drive Auto Company, Clintonville, Wisconsin, and Kitchener, Ontario, Canada.

Designed to meet specific needs in the highway field, Model HG was developed primarily for underbody blade service, but, aside

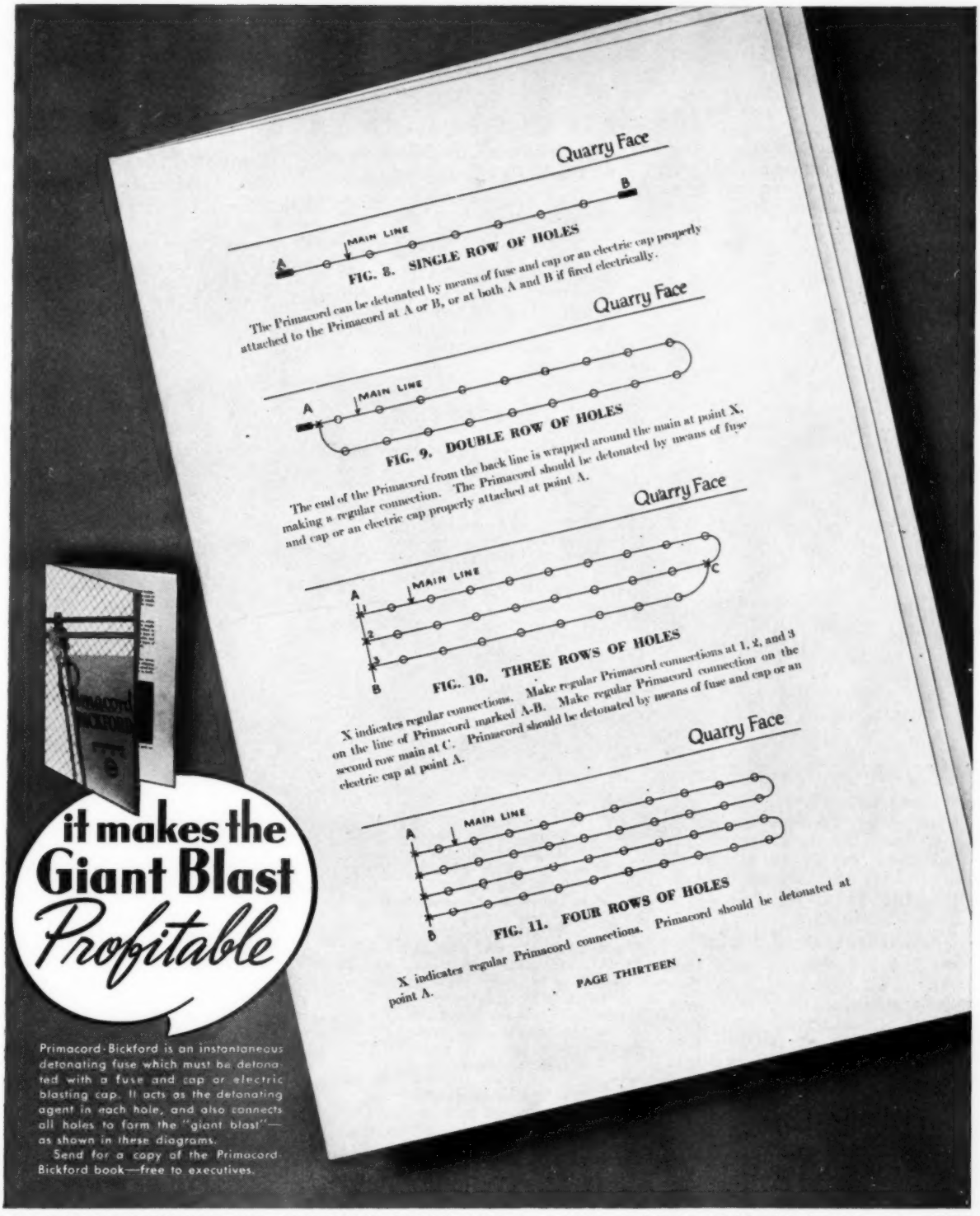
from this, serves every purpose as a truck and is ideally suited for snow removal, with either a one-way or "V" type plow.

The blade, which is operated by controls in the cab, may be set at any angle to carry the material to either right or left. The grader blade is operated by two double acting hydraulic cylinders, allowing the operator to make a very deep cut with the point and raise the heel of the grader above the ground for ditch work.

Portable Compressor Unit

A new portable air compressor unit for a wide variety of uses consists of a Model "B" Allis-Chalmers Tractor and a Model

WW80 water cooled Quincy Compressor. According to its designers, this assembly is especially suitable for running compressed air equipment right up to the spot where the air is required. The


Quarry Face
MAIN LINE
A
B
FIG. 8. SINGLE ROW OF HOLES
The Primacord can be detonated by means of fuse and cap or an electric cap properly attached to the Primacord at A or B, or at both A and B if fired electrically.
Quarry Face
MAIN LINE
A
FIG. 9. DOUBLE ROW OF HOLES
The end of the Primacord from the back line is wrapped around the main at point X, making a regular connection. The Primacord should be detonated by means of fuse and cap or an electric cap properly attached at point A.
Quarry Face
MAIN LINE
A
1
2
3
B
C
FIG. 10. THREE ROWS OF HOLES
X indicates regular connections. Make regular Primacord connections at 1, 2, and 3 on the line of Primacord marked A-B. Make regular Primacord connection on the second row main at C. Primacord should be detonated by means of fuse and cap or an electric cap at point A.
Quarry Face
MAIN LINE
A
B
FIG. 11. FOUR ROWS OF HOLES
X indicates regular Primacord connections. Primacord should be detonated at point A.
PAGE THIRTEEN
it makes the Giant Blast Profitable
Primacord-Bickford is an instantaneous detonating fuse which must be detonated with a fuse and cap or electric blasting cap. It acts as the detonating agent in each hole, and also connects all holes to form the "giant blast"—as shown in these diagrams.
Send for a copy of the Primacord-Bickford book—free to executives.

THE ENSIGN-BICKFORD CO., SIMSBURY, CONN., U. S. A. *Makers of Ensign-Bickford Safety Fuse since 1836*

PRIMACORD-BICKFORD *Detonating Fuse*

PB 10

For your convenience in writing to The Ensign-Bickford Co., you will find a card bound in this issue.

tractor's ability to turn in its tracks and to absorb bumps and jolts enables this unit to be driven to difficult places.

Free air delivery is approximately 58 cubic feet per minute at 80 lbs. per square inch discharge pressure which, according to the compressor manufacturers, is sufficient air for the continuous operation of a 38-40 pound jackhamer or other similar tools. The compressor may be quickly dismounted if the tractor is to be used for other purposes.

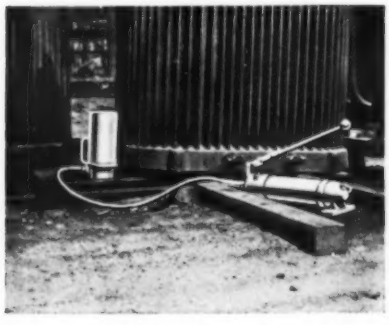
Electric and Gas Welding Unit

The Young Sales Company, Inc., of Milwaukee has recently introduced a double-duty gas and electric welding unit which combines the P&H-Hansen 150 ampere portable welder manufactured by the Harnischfeger Corporation of Milwaukee, and

gas equipment manufactured and developed by Young Sales Company, Inc. This combination unit is adaptable for all ordinary work and offers the field welder accessibility right to the job.

All-Directional Jack

A 50-ton hydraulic jack that works in all directions, according to the manufacturer, is a new product of Blackhawk Mfg. Company, Milwaukee, Wisconsin. The Model S-80, called the Porto-Power, can readily be carried to the job by one man as the pump



weighs 22 lbs. and the ram 60 lbs.

The jack includes two special saddles for pushing against bars, grooves, etc. A sleeve is available for converting the ram to a toe lift jack.

Low Pressure Lubrication

The Keystone Lubricating Company, Philadelphia, Pennsylvania, announces an addition to its line of Keystone BB Fittings, which inaugurated controlled low pressure lubrication when introduced to the industrial power market it is claimed. With the new combination type fitting, it is unnecessary to install a high pressure fitting, as the ball head of the combination fitting is designed for direct contact and with nozzles of standard push type or hydraulic high pressure grease guns, according to the manufacturer. The new combination embodies all the features of the standard fitting with the added advantage of the ball head integral with the fitting.

A Sale of Repairs

The boss he gazed with heavy frown
Upon his shovel broken down,
Then hastened to the nearest town
To buy repairs.
He told the dealer of his woe
And how much dirt he had to stow,
But not a number did he know,
Nor seemed to care.

"The part I want," he wisely said,
"Is hollowed out and painted red.
I had the number in my head,
But I forget.
It holds the thing-um-bob in place
About an inch from that long brace
That fastens to the big main base
An keeps it set."

"You surely know just what I mean,
It broke before on my machine,
The what-you-call-ums it's between
And just behind
The thing that moves along like that
About as big as this old hat
Would be if you should smash it flat,
I think you'll find."

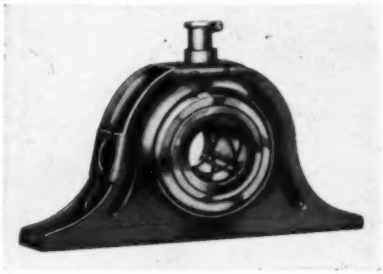
The dealer sighed and shook his head,
"I don't know what you mean," he said.
"We'll have to search the extra sheds,
So come along.
If you would only tax your brain,
So that the number you'd retain,
Or bring the old part, 'tis plain
You'd not go wrong."

From end to end he searched the bins,
Clawed over castings, bolts and pins,
And skinned his fingers, and his shins;
It made him "cuss".
But still he searched with sinking heart,
(He'd seen two customers depart.)
And in the last bin found the part.
'Twas over thus.

"That's it," the Boss cried out with glee,
"I thought 'twas number thirty-three,
Now, what's the price of that-to-me?
Great Jumpin' Frogs—
Not forty cents? An awful rate
For a thing that's got no weight,
Oh, well, just put it on the slate
Until I get my estimate.

Randall Pillow Block

A new light weight, patented pillow block has recently been announced by Randall Graphite Products Corporation, 609 W. Lake St., Chicago. The Randall



One-Piece Steel Housing Pillow Block consists of only three parts. It has increased oil capacity, assures full constant self-alignment, and runs more quietly, states the company. Available in shaft sizes from ½" to 1", it can be mounted in any position it is claimed.

Katolight Power Plant

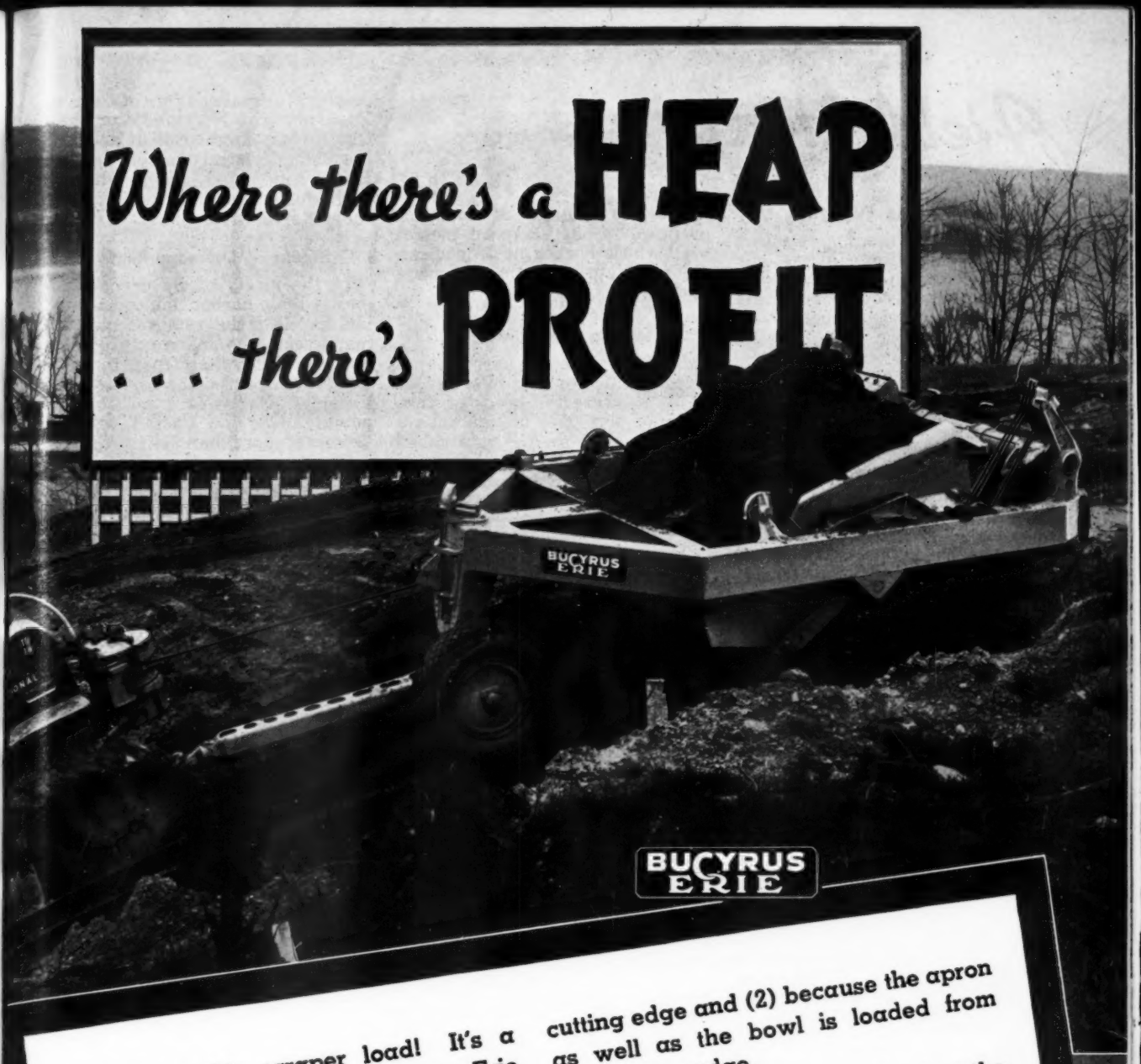
An A. C. Electric Plant that can be used for construction camps or as a power plant for supplying power for night floodlight work is being introduced by the Kato Engineering Company, Mankato, Minnesota. The unit, called "Katolight," comes in nine models ranging in wattage from 2,000 to 15,000.

Upon specification, the models from 3,500 watts and larger may be furnished with D. C. excitation winding suitable for cranking plant from 30 to 36 volts of battery. Being entirely enclosed, the plant is protected from dirt and can readily be used right on the job.

New Structural Glass

A major impetus to the building trades expected to stimulate numerous architectural innovations is foreseen in the introduction of gladstone, a new form of structural glass manufactured by Libbey-Owens-Ford Glass Co., Detroit.

Gladstone makes possible construction of glass-walled buildings to any height and offers the architect a wide range of colors.



LOOK at this scraper load! It's a common sight with a Bucyrus-Erie Scraper. A heaping load with a Bucyrus-Erie is easier to obtain than a normal load with most scrapers. The heap pays you extra profits.

Why is the Bucyrus-Erie easier to load? Principally (1) because of the boiling action caused by the double-curve cutting edge and (2) because the apron as well as the bowl is loaded from the cutting edge.

Look for heaping loads and select the scraper that gives them to you. Therein lies your profit. See your nearest International Harvester Industrial TracTractor Dealer for facts on big output features built into Bucyrus-Erie Scrapers.

Bucyrus·Erie

SOUTH MILWAUKEE, WISCONSIN

Field NOTES

Submarine Blasting

Although submarine blasting presents difficulties limited only by the peculiarities of each job, and while its requirements are more exacting than almost any other kind, yet the practical judgment of the blaster has been so enriched by his experiences in this field that the elements of groping and guesswork no longer represent the major problems they once were.

In large-scale harbor improvements, where the water is deep and the rock hard, the deepening process is likely to be slow and laborious, even when gelatine dynamites ranging in strength up to 90 per cent are used. But with better methods devised for the drilling and loading of deep holes, and firing lines doubly insured against failure, major underwater operations have been expedited to a very considerable degree. And the time and expense involved is generally of small importance to the seaboard metropolis whose harbor no longer can accommodate the demands made upon it.

Clearing Miami's Harbor

In 1934, when the narrow, one-ship channel of Miami's harbor failed to serve the needs of that growing port, two million dollars were set aside for the removal of nearly 2,600,000 cubic yards of material. A large part of the area to be dredged lay under 25 feet of water, but within the first year, with the help of 250,000 pounds of nitroglycerin dynamite, the great dredges had brought up more than 1,700,000 cubic yards, completing nearly 68 per cent of the job at an unusually small cost per yard.

In fact, one of the finest harbors in the world — New York — owes to dynamite the channels that opened it to the super-liners and deep-draft dreadnaughts of today. Even now the Normandie or the Queen Mary might ride at anchor in some open roadstead off Sandy Hook had not dynamite hewn paths for them to the security of their North River piers.

Removing Diamond Reefe

In the nicety of its execution, perhaps no harbor improvement has excelled the removal not so many years ago of Diamond Reef, an exceedingly hard-rock formation which barred the way to the Brooklyn Navy Yard and other points along the East River of vessels of more than 30-foot draft.

To clear away this barrier it was necessary to remove considerable rock directly over a downtown subway tunnel. But even though only 35 feet of rock intervened the 100-pound charges and the tubes, scarcely a tremor was to be felt on the busy tracks below, and traffic was not interrupted save for a few minutes at a time.

Set rules of procedure and operation in under-water blasting usually give way to the exigencies of each and every job. Many rules and formulae have been worked out, but generally to the consternation of the engineer who would apply them rigidly to the innumerable variations of his submarine work.

Placing the Holes

It is, however, considered good practice to extend the bore holes the same distance below the desired grade as the charges themselves are spaced apart. To meet the conditions of actual work, the strength of the explosive and the diameter of the hole may vary, but the relative depth below grade is generally adhered to regardless of the nature of the ground.

Although this practice is best calculated to insure an even grade, often it is practicable to sink the bore holes to a lesser depth, provided homogeneous material and horizontal stratification invite the blaster to shorten his drill.

Variety of Drills Used

Various types of drills are used in submarine rock excavation. As a rule, heavy type percussion drills driven by steam are employed, Air drills have been com-

● A barge-mounted Bucyrus-Erie blast hole drill working on a harbor improvement job.

A MONEY MAKER FOR KNOXVILLE SANGRAVL MATERIAL COMPANY

● Less than sixteen miles from their half million dollar gravel plant, the Knoxville Sangravl Company set up an Austin-Western crushing and screening plant to handle 80,000 tons of gravel dredged from the Tennessee River. Easily producing 75 to 100 tons of acceptable size material per hour, the company showed a satisfactory profit on the operation.

The Knoxville Sangravl Company's experience is a concrete example of the profits a fixed plant producer can secure from portable plant operation.

High output and low maintenance are assured, for the deep jaws, operating at unusually high speeds on oversize shafts and oversize bearings are so carefully designed and well made that, size for size, they outperform and outlast all other jaw crushers in fixed or portable plants. The screens, conveyers, etc., are ruggedly built and designed to put out aggregate at top speed, no bottle necks to choke production.

Readily portable on pneumatic tires, there is a portable plant to meet any capacity you require. Ask us to send you details on profits from portable plant operation.

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ROAD MACHINERY CO., Aurora, Illinois

Motor Graders	Crushing and Screening Plants	Motor Sweepers	5-Yard Tractor-Scraper
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Rollers	Blade Graders	Bituminous Distributors	8-Yard Tractor Scraper
Snow Plows		Elevating Graders	12-Yard Hydraulic Scraper

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ing into favor of late. Often, well drills or churn drills are also used. The drills of either type, several in number, are usually mounted on one side of the drill boat. They can be moved longitudinally in order to fit any determined spacing of the holes. The explosive charge, usually gelatin or straight dynamite, is sometimes packed in thin gauge metal tubing on deck and each tube lowered into the bore hole. Again, the dynamite cartridges are lowered directly into the bore hole by means of a device called the "submarine charger." After the charges are lowered to the bottom of the hole, the cartridges are pushed out through the bottom of the pipe and the whole device withdrawn to be used again.

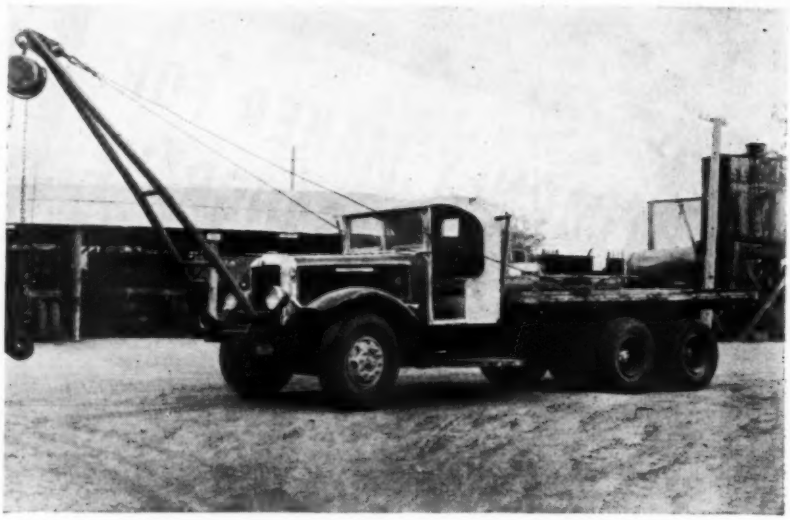
Recent trials seem to indicate the development for submarine use of explosives whose erruptive power is wholly unaffected by water pressure, a factor hitherto always taken into account when calculating loads. Other advancements in the field of explosives of low density but high velocity promise to further the work of the submarine blaster.

General Utility Truck

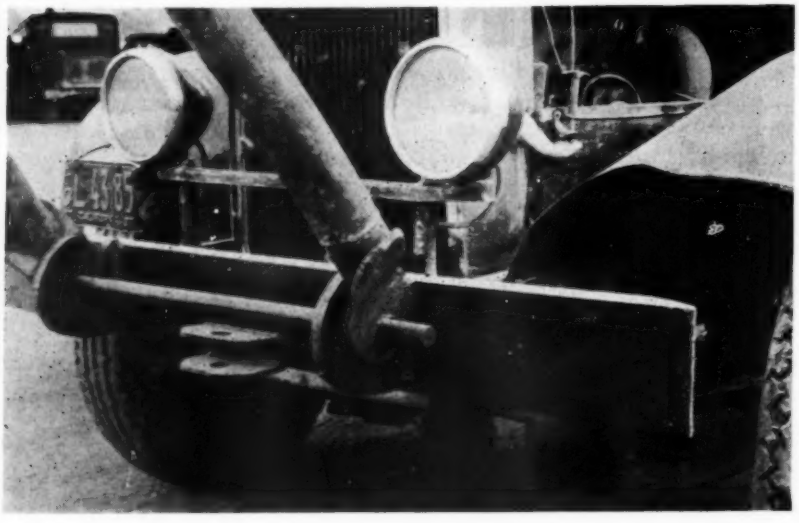
By Jos. C. Coyle

In 1935, at the beginning of excavation on the All-American Canal, W. E. Callahan Construction Company and Gunther & Shirley established an office and an extensive equipment and repair yard at Colorado Siding, California, near Yuma. For three years the well equipped repair shop at that point was kept busy with all kinds of maintenance work in connection with the firm's several Bucyrus-Monighan draglines and other equipment used in excavating canals at two, and part of the time three, locations. Much of the heavy repair work is still done there, although distance finally caused a well equipped field shop on skids to be used on the firm's present Coachella Branch canal contract.

Various parts and materials for repair had to be moved to the welding shed, the 300 ton hydraulic press, the storage platforms, or loaded on a truck. A flat bed truck, also used a great deal in hauling between the shops and the field, was equipped with a detachable boom for this service.



● The general utility truck with "A" boom attached and braced by two guy wires. A chain hoist is suspended from the eye plate at the end of the boom.

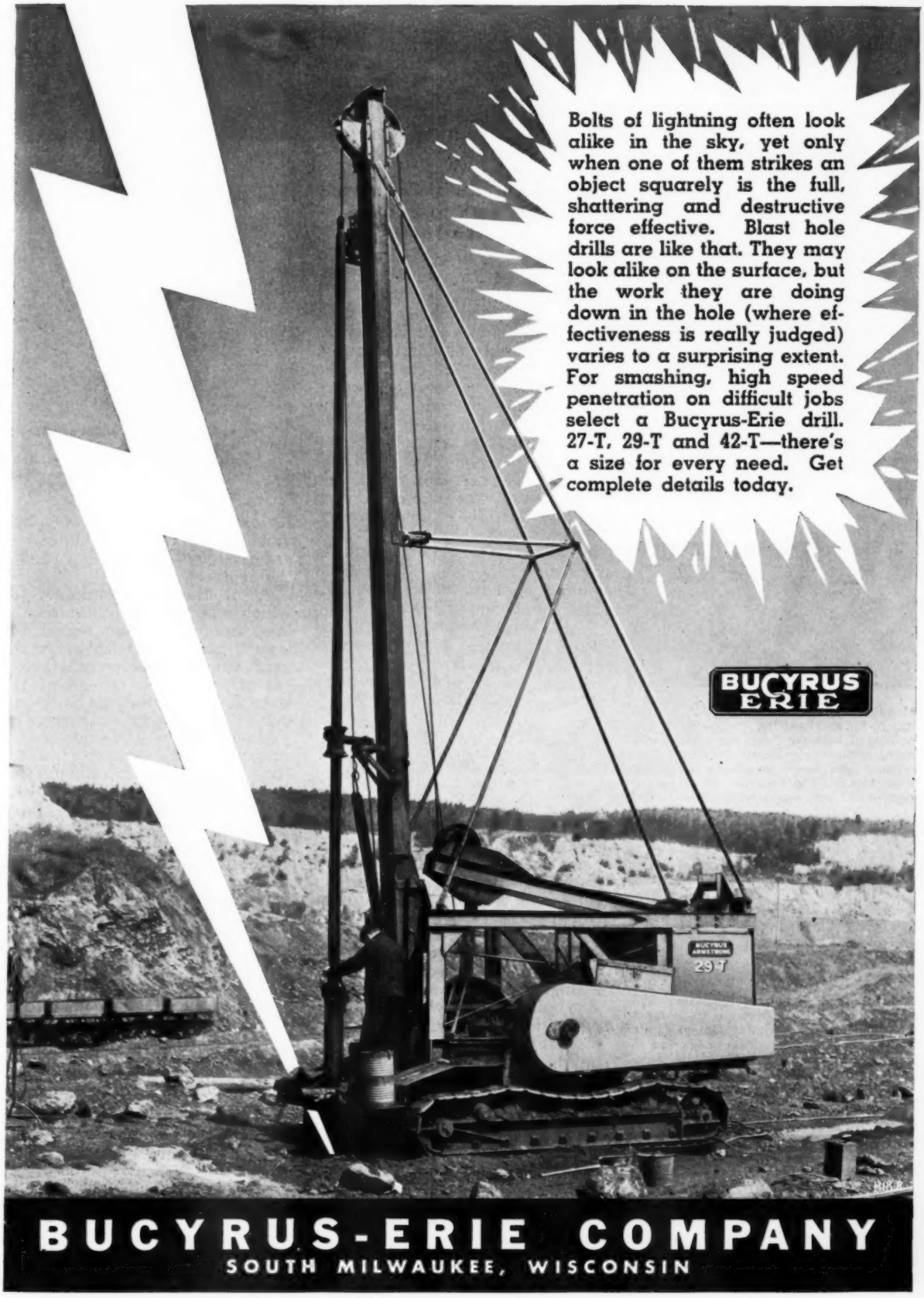


● Close-up showing detail of boom to bumper arrangement. Note the two large hooks, torch-cut from one-inch steel plate, welded vertically to the channel bumper.

The front bumper was replaced by a section of steel channel and a clevis hitch welded to the middle of it for pulling or towing by the front end. Two large hooks, cut from 1-inch plate with a torch, were welded vertically to the channel bumper. These receive a 1¼-inch round bar supporting the bottom end of the 20-foot "A" boom. The bar passes through, and is welded to, an oval section of 1-inch plate welded to each boom member and bent to fit snug against the outside of each bumper hook.

The 4-inch pipes forming the boom are braced by two smaller cross members, and have two eye plates welded to the top end, the lower one for hooking a chain hoist, the other for two guy cables used when carrying a load. Each of these guys attaches to an "L" shaped hook thrust into a stake loop on the truck bed and held firm by a tapered pin. With the pin driven home in the extra strong stake loops, formed by welding a bar to the edge of the metal truck bed, a short projection on the tip of the hook engages the bed and prevents slipping. The guy cables fasten into an eye in the hook.

When the boom is not in use the top end is moved up to a post in the yard and secured to a hook on the post at the right height. The bottom end is then lifted out of the bumper hooks, the guy cables loosened from the truck bed and the boom hangs on the post


Bolts of lightning often look alike in the sky, yet only when one of them strikes an object squarely is the full, shattering and destructive force effective. Blast hole drills are like that. They may look alike on the surface, but the work they are doing down in the hole (where effectiveness is really judged) varies to a surprising extent. For smashing, high speed penetration on difficult jobs select a Bucyrus-Erie drill. 27-T, 29-T and 42-T—there's a size for every need. Get complete details today.
BUCYRUS ERIE
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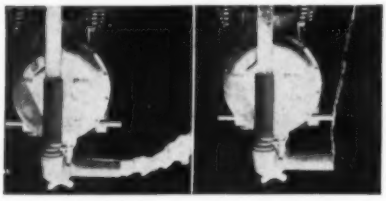
Goes Anywhere—Gets there fast. It's no trouble to get rid of water—**anywhere or anytime**—if you have a Homelite 3" Portable Pump. Small and compact—only 91 pounds complete with engine—it is rushed to the job easily in small truck or car or kept handy in tool box. It can be set up and started readily **by one man** in places that larger pumps couldn't reach.



Handles Seepage or a Flood. No job is too tough for a Homelite. It pumps 15,000 gallons of water and has the fastest automatic self-priming. Handles seepage in any amount and keeps it **always** at strainer level. Has a 28 foot suction lift and pumps against 70 foot heads.

Doesn't Clog. A Homelite passes 35% sand or other solids through its patented non-clogging, self-scouring body without trouble. Cleaning is unnecessary. And the complete unit is built for long life. Finest materials throughout. Absolutely weatherproof, waterproof, and foolproof.

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This new, free bulletin shows how Homelite Portable Pumps are saving time, money and trouble for thousands the world over. Write for your copy, **now.**

HOMELITE
CORPORATION
2207 Riverdale Ave., Port Chester, N. Y.

until needed again. It is also used in lifting and towing a car or truck, by placing the bottom end bar in two vertical hooks welded on the rear edge of the bed, and anchoring the guy cables near the front end of the bed instead of the rear. One man can remove or install the boom.

Using a Plumbers' Perforated Hanger Iron to Padlock Isolated Tools

Short pieces of chain are commonly used with a small padlock to safeguard shovels, pails, and other tools necessarily isolated when not in use and left where they can easily be carried away. However, pieces of chain of the right size are usually scarce around the job and would be expensive to purchase.

Ordinary plumbers' hanger iron which is easily obtained and inexpensive is already perforated with suitable holes and is very suitable for the same purpose. Bent into a U shape over the tool and object to which the tool is to be anchored, a small lock is easily applied thru the holes as shown. The usual perforated strap iron of this type is ⅞" in width and heavy enough to quickly discourage any hurried borrower who forgets to return or replace things.—*F. W. Bentley*

Look Out For This Legal Quirk

By Arthur L. H. Street

How an excavating contractor lost out because he learned a legal lesson after, instead of before, performing a job is shown by the decision of the Appellate Court of Illinois, in the case of Bairstow v. Northwestern University, 5 N. E. 2d, 269.

Excavator Bairstow contracted to excavate for two buildings on a single tract of land, and did so. The building project was not completed and he sued to enforce a mechanic's lien. A building permit had been secured for one of the buildings, but not for the other. The court decided that a lien could be enforced for the excavation for the building for which a permit was issued, but not for the excavation for the other building.

As to the building for which no permit was obtained, though required by the local municipal building code, the court applied a well settled rule that where performance of a contract involves violation of law, no rights can be enforced by either party under the contract.

• **A piece of the plumber's hanger iron as it appears in use. The lock slides quickly through the holes making the shovel hard to "borrow."**

As to the other building, for which a permit was obtained, the landowner, who had leased the land to the party with whom the excavating contractor contracted, contended that, since all of the work on both buildings was to be done under a single contract, invalidity of the agreement (because no permit was obtained for the first building) invalidated the whole contract. But the court said that since the contract separated the two jobs, fixing a separate price for each, the contract was severable and enforceable so far as legal. So, a lien was allowed for the excavation for the second building. The court applied the following rule laid down by the Illinois Supreme Court in an earlier case:

"If the part" of a contract "to be performed by one party consists of several distinct and separate items, and the price to be paid by the other is apportioned to each item to be performed, or is left to be implied by law, such a contract will generally be held to be severable; and the same rule holds where the price to be paid is clearly and distinctly apportioned to different parts of what is to be performed, although the latter is in its nature single and entire."

The decision in this case is not

(Continued on page 416)

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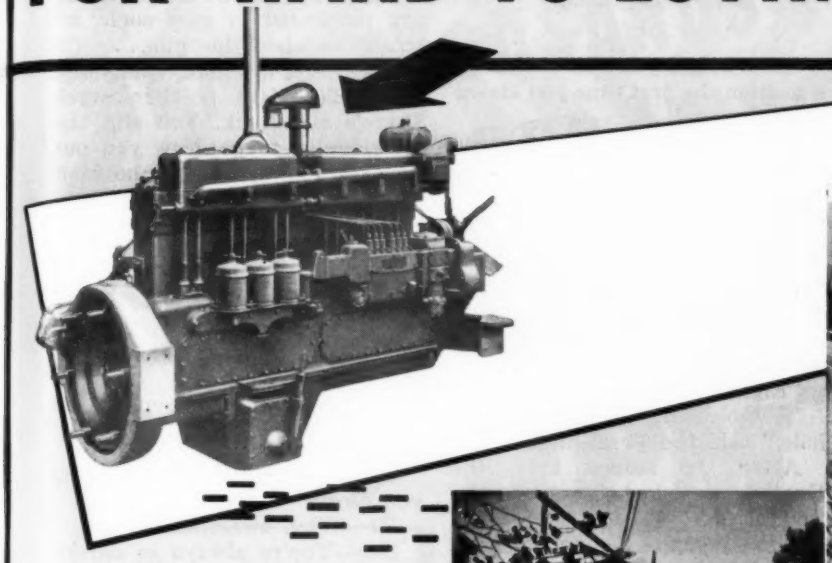
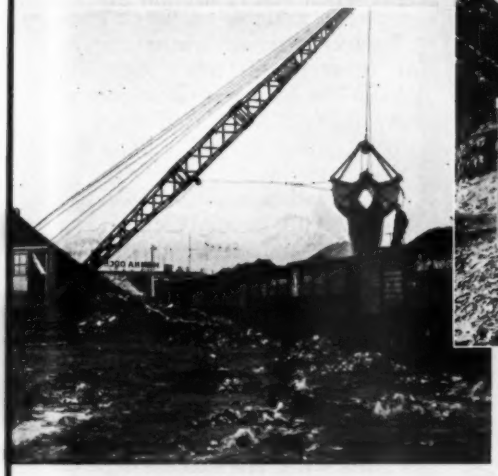
FOR HARD-TO-ESTIMATE JOBS



DAUPHIN, PA. — "Caterpillar" D11000, mounted on truck, driving Davey compressor for operating wagon drills. Works 24 hours a day on 3½ gals. of 7c fuel per hour.



DULUTH, MINN. — "Caterpillar" D11000 powering Bucyrus-Erie Clamshell (50-ft. boom; 2¾-yd. bucket). Uses 2½ gals. of 9.7c fuel per hour on 8-hour shift.

BUCHANAN, VA. — "Caterpillar" D13000 powering a 24x56 Telsmith crusher. Runs 10 hrs. a day on less than 35c worth of fuel per hour.

WHEN TIME, tonnage or yardage is the "essence" of the contract, you need power that won't let you down. From job-tested performances in an ever-widening field, "Caterpillar" Diesel Engines are constantly bringing in convincing evidence that here is power you can trust. . . . *They're dependable!* Up against dust, grit, severe loads, adverse weather, 24-hour going—"Caterpillar" Diesels drive right along. They work efficiently with all kinds of equipment; handle all kinds of jobs. With such faithful power you *know* what you can do—your bids are *safe!*

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NOT in the *Contract*

Mrs. John Smith was a widow for several years before she died and went up to heaven. Upon arriving, she went to the Heaven Information Bureau to locate her husband.

The Clerk was puzzled. "John Smith? We have a lot of John Smiths here. What did he look like?"

"He was a tall blond," promptly answered Mrs. Smith.

"We have a lot of tall blond John Smiths here," said the Clerk. "You'll have to tell me more about your husband. For instance, what did he say just before he died?"

"He told me how much he loved me and said if I was ever untrue to him he would turn over in his grave."

"Oh!" said the Clerk. "You mean old 'Whirling John' Smith!"

"Mary," inquired the lady of the house, suspiciously, "did you wash this fish before you baked it?"

And Mary replied: "What's the use of washing a fish that has been in the water all his life?"

She—Didn't you feel a strange sensation the first time you kissed a girl?

He—Naw, she was no stranger and she was no sensation.

Two golfers were playing a match for a wager. After the first hole, the Englishman turned to his Scots opponent.

"How many did you take?" he asked.

"Eight," replied the Scotsman.

"I took seven, so that's my hole," said the Englishman.

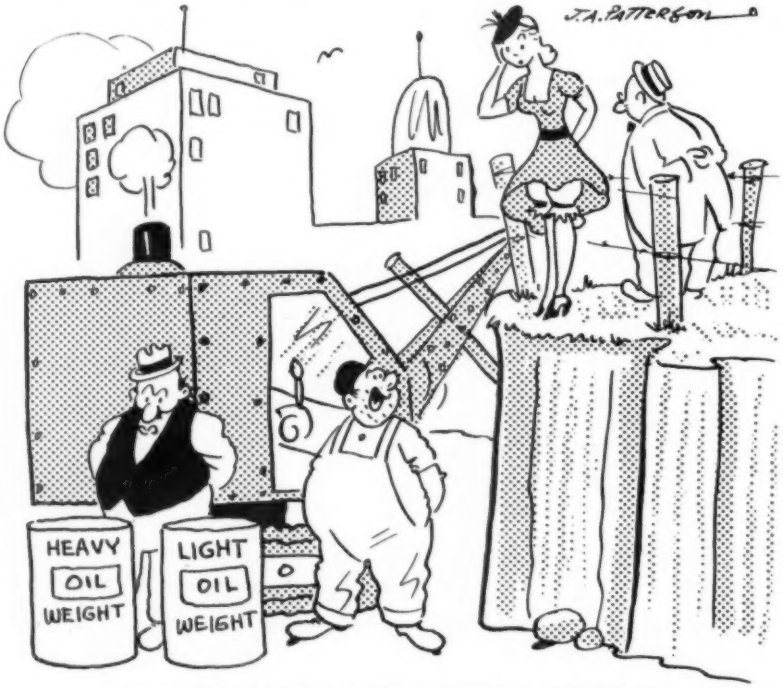
After the second hole, the Englishman asked the same question.

This time the Scotsman shook his head.

"Na, na, laddie," he replied, "it's mae turn to ask feerst now."

Mrs. Simpkins: "Listen to me. I'm sick and tired of talk about 'my car' and 'my furniture' and 'my son'. It's getting on my nerves and you're going to learn to say 'our'. What are you looking for now in that closet?"

Mr. Simpkins: "Our pants."



"Yep, I sure do think she ought to be changed for summer, boss!"

At target practice of a company of National Guard the captain swaggered up to the latest recruit and proceeded to give some instructions about his gun.

"See here, my man, this thing is a rifle. Here is the barrel. There's the stock. You slip the cartridge in there. Now you put the weapon to your shoulder. These little things on the barrel are the sights. When you have taken accurate aim, pull this little thing, which is the trigger. Now remember what I have told you. Smarten up and look more like a soldier. By the way, what is your business? A clerk, I suppose."

"No, sir," was the reply, "I'm a gunsmith."

She—I'm going to start calling you girdle.

He—Why, sweetheart?

She—You're always so darned tight when you're around me!

Backwoodsman (returning to his theater seat after intermission): Did I step on your toes as we went out?

Seated Man (grimly): You did, sir.

Backwoodsman: Here we are, Matilda. This is our place.

It seems Operator Olaf has heard of a waitress who was so dumb she didn't know whether lettuce was a vegetable or a proposition.

Just a thought: Man has two ends—one to sit on and the other to think with. His success depends on which he uses the most.

"I left my husband when I caught him cheating at poker."

"He had an ace up his sleeve?"

"No, he had a queen on his lap."

Mother: Well, how did you get along in school today?

Johnny: All right, but that new teacher is always asking us some fool question. Asked everybody in the class to tell where they were born!

Mother: You certainly knew the answer to that question—the Woman's hospital.

Johnny: Betcha life I knew! But I didn't want the whole class to think I was a darn sissy so I said the Yankee Stadium.

AFTER THOUSANDS OF HOURS IN HOTTER THAN DESERT HEAT

New "RPM" DELO

[Diesel Engine Lubricating Oil]

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Keeps rings free—filters clean—and bearings free from corrosion

Millions of miles, and thousands of hours of tests have proved NEW "RPM" DELO is the UNEQUALED lubricating oil for every type of Diesel engine, under every operating condition, in any kind of weather. For example—

Take the HOT-BOX TEST—one of the most severe performance tests ever devised. We operated typical Diesel engines under full load enclosed in boxes where the radiators were fed with air at 125° F. This drove the sump-oil temperature to scorching heat—which was maintained 24 hours a day, every day for over a month! RESULT: All rings free, oil ring slots open, carbon and sludge negligible. Engine in perfect condition!

And when it's cold, NEW "RPM" DELO continues to do its same unequaled job. Extended tests with a water-jacket temperature held down to 80° F., and with water actually added to the crankcase at 20-hour intervals, also resulted in clean-engine, ring-free operation. No clogged filters or stoppage of oil flow, either.

Ask our Representative or your nearest Distributor to show you the complete Engineers' Report on NEW "RPM" DELO with pictures and charts, proving the superior performance of this oil. Still better—prove its cost-cutting advantages for yourself in your own Diesel engines.

NEW "RPM" Diesel Engine Lubricating Oil now available everywhere in the gray barrel with the blue head

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Shots from the FIRING LINE

Pennsylvania Turnpike Awards

Nine contracts totaling $3,717,123.56 for 38.09 miles of construction work on the 160-mile PWA-RFC financed Pennsylvania Turnpike were among those awarded last month by the Turnpike Commission.

The awards, subject to PWA approval, were:

C. J. Langenfelder and Son, Rosedale, Md., $731,466.88, for 9.54 miles of grading and drainage and 10 structures in Metal and Fannett townships, Franklin County. (Section 18.)

Ferguson and Edmundson Company, Pittsburgh, $489,540.55, for 4.33 miles of grading and drainage and nine structures in Hempfield township, Westmoreland County. (Section 2B and 3A1.)

Adam Eidemiller, Greensburg, $699,588.14, for 5.36 miles of grading and drainage and six structures in Donegal and Mt. Pleasant townships, Westmoreland County. (Section 5A).

George Vang, Inc., Pittsburgh, $616,596.24 for 5.52 miles of grading and drainage in Donegal and Crook townships, Westmoreland County. (Section 5 and 6).

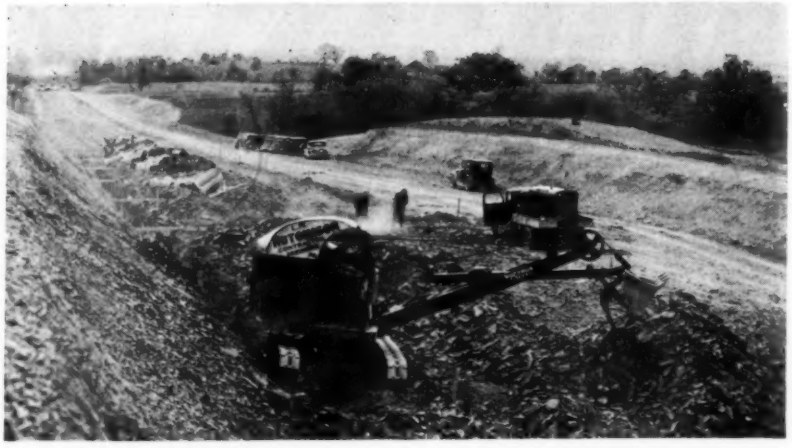
McCrady Construction Company, Pittsburgh, $354,072.13, for 2.88 miles of grading and drainage in North Huntingdon and Hempfield townships. (Section 2). Bids had been opened twice previously on this job but all were later rejected.

H. R. Dickens, Philadelphia, $138,466.87, for 1.07 miles of grading and drainage and two plate girder grade separation structures in Stony Creek and Somerset townships, Somerset County. (Section 8C1 and 9A1).

H. W. Shaull & Son, Mechanicsburg, Pa., $287,833.77, for 4.92 miles of grading and drainage and construction of reinforced concrete structures in Lurgan township, Franklin County, and in Hopewell township, Cumberland County. (Section 18A and 19C).

N. B. Putman Company, Harrisburg, $164,955.98, for 1.51 miles, six reinforced concrete grade separation structures and approaches in Juniata and Napier townships, Bedford County. (Section 11B).

Dalton Bros., Inc., Paoli, Pa., $234,593, for 1.96 miles, grading and drainage and construction of reinforced concrete structures and two plate girder structures in Dublin township, Fulton County. (Section 16B).



● L. M. Hutchison of Orbisonia, Pennsylvania working near Newburg, Pennsylvania, uses his ⅜-yard shovel for ditch work through shale and rock on the 161 mile Pennsylvania Turnpike.

● A 1¾-yard shovel bites into heavy shale near Breezewood, Pennsylvania, for the Empire Construction Company, on a section of the all-weather $60,000,000 Pennsylvania Turnpike project.

Shasta Dam Railroad Relocation

Shortly after the award on May 29 the award of two contracts totaling $642,144.50 for the construction of two railroad bridges and two highway underpasses work was started on the relocation of the Southern Pacific Railroad around the site of the Shasta reservoir of the Central Valley Federal Reclamation project in California.

Clifford A. Dunn of Klamath Falls, Oregon obtained one contract on his bid of $347,779.50. This contract covers construction of abutments and piers for both the railroad bridge across Doney Creek and the railroad bridge known as the second crossing of the Sacramento River, and the construction of two underpasses to carry U. S. highway 99 across the relocated railroad.

The other contract awarded to the Bethlehem Steel Company of San Francisco, California on its bid of $294,365.00, covers the fabrication and erection of the steel superstructure for both the Doney Creek and the Sacramento River second crossing bridges.

Work covered in these contracts is being done along the northern section of the 30-mile railroad relocation north of Pollock, Cailifornia. The Sacramento River bridge second crossing will be about 1,040 feet long and 211 feet high from the bottom of the deepest pier

foundation to the deck of the bridge. Dimensions of the Doney Creek birdge call for a length of about 653 feet and a height of about 170 feet from the deepest pier foundation to the deck of the bridge.

The contractors are given various times to complete parts of the work involved extending from 150 days to 290 days.

Vote on Non-Military Appropriation Bill

A chorus of Senatorial votes last June restored to the War Department non-military appropriation bill the House figures of $39,000,000 for Mississippi River flood control; $133,000,000 for National flood control, and $55,000,000 for new river and harbor work.

The bill was passed after a hot fight led by Senator Adams of Colorado to delete $50,000,000 added by the House to Budget recommendations. After Senator Barkley of Kentucky announced the President is willing to allocate from the forthcoming relief bill the sum of $50,000,000 for flood control and rivers and harbors, a majority of the Senators accepted the view of Senator Johnson of California that no economy was involved and that the additional funds might as well be appropriated outright without any restrictions.

After restoring the House figures to the bill, three amendments were offered and approved. The first, by Senator Thomas, was as follows:

"Provided further, that funds appropriated herein may be used to execute detailed surveys, prepare plans and specifications, and procure options on land and property necessary for the construction of authorized flood control projects or for flood control projects considered for selection in accordance with the provisions of Section 4 of the flood control act approved June 28, 1938; Provided further, that the expenditure of funds for completing the necessary surveys and securing opinions shall not be construed as a commitment of the Government to the construction of any project."

The next amendment was offered by Senator McKellar as follows:

"Provided further, that the conditions of local cooperation for the Memphis, Tenn., flood control project, authorized by the flood control act approved August 28, 1937, shall be so modified that the cost of providing pumping stations and outlet works for interior drainage shall be borne by the United States, all in accordance with plans to be approved by the Chief of Engineers."

In behalf of Senator Overton, Senator Thomas offered the following resolution to correct an imperfection in the authorization of Bayou Bodcau:

"Provided further, that the reservoir and other flood control works on Bayou Bodcau and Cypress Bayou, La., authorized by the flood control act approved June 28, 1938, shall be constructed in accordance with the revised plans and cost estimates now in the Office, Chief of Engineers."

The Bill now goes to conference for approval or rejection of the Senate amendments. The figures inserted in the bill are not subject to change since both House and Senate appropriations are identical. As soon as the bill is finally passed by the two Houses and signed by the President, funds will be allocated by telegraph to the various Engineer Districts over the United States and a huge construction program will get under way at once.

Approve Denison Dam Plans

Approval of the revised plans for the proposed Denison Dam, a flood control and hydro-electric project to be constructed on the Red River near Denison, Texas has been announced by Capt. Lucius D. Clay, district engineer in charge of the project. The revised plans, approved by Major General Julian L. Schley, chief of engineers, reduce the originally planned height of 190 ft. to 165 ft. bringing the total cost of the project to $50,800,000 instead of the original $54,000,000.

Denison Dam is listed by the Chief of Engineers as one of the projects on

(Continued on page 410)

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Dirt Moving Deluxe

(Continued from page 38½)

a power house which also shelters bit dressing equipment.

Rock is blasted from a perpendicular wall with Hercules and Atlas powder and loaded by the previously mentioned veteran 50-B Bucyrus-Erie steamer with a 2½-yard dipper. Larger rocks are handled by sling. Mack trucks dump the rock into a nearby grizzly which not only grades the material but saves trucks the last steep climb to the quarry. Instead of I-beams, railroad rails, with small angles welded on top of each, separate the stones.

The spillway, which is designed to carry 101,000 cu. ft. of water per second, will rest on a foundation which is mostly sandstone. This material is being channeled with a Sullivan electric rock saw of the type used in coal mining. Instead of undercutting horizontally, however, the saw is operated vertically, removing a three-inch groove of kerf. There is some difficulty in performing this operation as the formation in some places is so soft that the saw gums up, while in others it rides over the extra hard material.

Ledges Left in Stair-step Form

An unusual feature of this excavation is that ledges are left in stair-step form, sloping to conform to the rock strata. In order to prevent the exposed sandstone from disintegrating, the surfaces are covered with a three-inch layer of gunnite. The stone is first covered with 1-inch poultry netting, then the concrete is sprayed on in 3 layers, allowing two days drying time between layers. During the two weeks curing period, concrete is kept moist by frequent water spraying.

Concrete for the spillway is poured from 2-yard buckets by four stiff-leg electric derricks equipped with 120-foot booms. Each derrick is supported by two 80-foot braces, the latter anchored by 30 tons of rock held in cribs 10-feet each way, made of 3-inch planks. Five 5 x 12-inch I-beams run both ways under the cribs, which are held together by four ⅞-inch rods each way near the top and an equal number near the bottom. The cribs can be dismantled for moving simply by pulling out the bolts and letting the walls fall down.

Concrete is batched in a nearby plant and hauled to the derricks in 4-yard transit-mix trucks. For some parts of the spillway concrete is handled in a 4-yard Garbro bucket.

Spillway Ogee Dimensions

The spillway ogee will be 70 feet high, 302 feet wide, and about 100 feet thick at the base, and the entire structure will extend nearly 1,000 feet up and down stream. A service bridge supported by six pillars will cross the spillway 17 feet above its crest, or in an even line with the top of the dam. Ten square conduits will extend

● Digging out the cut-off trench for the concrete key wall of the dam, this 100-B, swinging a 7-yard bucket, kept a fleet of 16-yard Sterling diesel trucks rolling.

PURPLE-STRAND *FORM-SET* WIRE ROPE

BETHLEHEM Specify FORM-SET PRE-FORMED ROPE

Here's what *FORM-SET* means

IN WIRE ROPE, individual wires and strands form a helical or screw pattern in the complete rope. Ordinarily these individual wires and strands are straight before entering the stranding and closing dies. They are forced into this helical shape and held there by seizing at the end of the rope. Remove this seizing, and strands fly apart from internal pressures.

By pre-forming rope, strands can be formed into this helical pattern before or during the closing of the rope. Individual wires are "set" in position at the same time. Result is a rope in which each wire and each strand lies in position without internal tension or pressure. Ends do not require seizing. The line might be termed "relaxed."

Form-Set is such a line. Strands have been preformed so that they are relaxed rather than being under spring tension. Not until the rope itself goes to work do the wires come under heavy stresses. As a result, the rope has greater fatigue life. It is easier to handle and break in. It spools better. It is less likely to kink. It resists whipping. Experience has shown that Form-Set gives more ton miles per dollar in spite of its somewhat higher first cost.

The combination of Form-Set construction and Purple-Strand quality gives you as fine a line as money can buy. It is built for the particular job and designed by men who know the conditions to be met. It is produced by a company which has spent three-quarters of a century making fine steel. For these reasons thousands of contractors consider Form-Set Purple Strand *the* line for heavy jobs.

Bethlehem wire rope is available through distributors. Write Bethlehem Steel Company, Bethlehem, Pa., for the names of wire-rope distributors in your vicinity.

BETHLEHEM STEEL COMPANY

BETHLEHEM STEEL

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through the bottom of the ogee. The center two, 8 feet square, will have intake ends 10 feet above the others and will be used for bypassing the stream flow. The other conduits, 5 x 8 feet, will be equipped with steel gates operated by hydraulic pumps electrically powered.

A rock fill below the spillway is to be covered with concrete, while the channel below this crib cut-off will be protected with 70,000 cu. yds. of stone, one-half of the stones weighing from 1,000 pounds to 3 tons each and the rest from 3 tons up. Cutoff concrete key walls 15 feet high, sloping from 3 feet thick at the bottom to 12 inches at the top, will tie the dam to the spillway on either side and to the hills on either end.

Complete Maintenance Shop

An unusually well equipped shop has been set up at the site which takes care of all maintenance. Blacksmith, welding, garage, lathe, and all shop facilities, employing around 90 men, are available here 24 hours a day. Their biggest problem, according to C. E. Ferguson, master mechanic in charge of maintenance, has been ironing out the "bugs" incidental to new equipment. The production indicates that this has been pretty well taken care of.

On the entire project between 1,100 and 1,200 men are employed. Work is carried on in three 7½-hour shifts 6 days a week.

Major Theodore Wyman, Jr. is district engineer for the U. S. Army Engineering Corps, and operations of the Guy F. Atkinson Company are in charge of George H. Atkinson, job manager, and A. E. Holt, general superintendent. J. A. Kier is assistant superintendent, D. E. Root, chief engineer, J. J. Nunn, equipment engineer, and E. M. Jennett, Assistant manager.

● **Left: One of the old Bucyrus-Erie 50-B steamers loads heavy rock for fill on the downstream toe and spillway. Right: A blasting crew does some secondary blasting in the rock quarry at Little Tujunga Canyon.**

Mining Bentonite

(Continued from page 386)

tween the dragline and the truck to catch any bentonite that is spilled and keep it clean for reloading. All these precautions by the Domingos Construction Company have resulted in a minimum of bentonite waste.

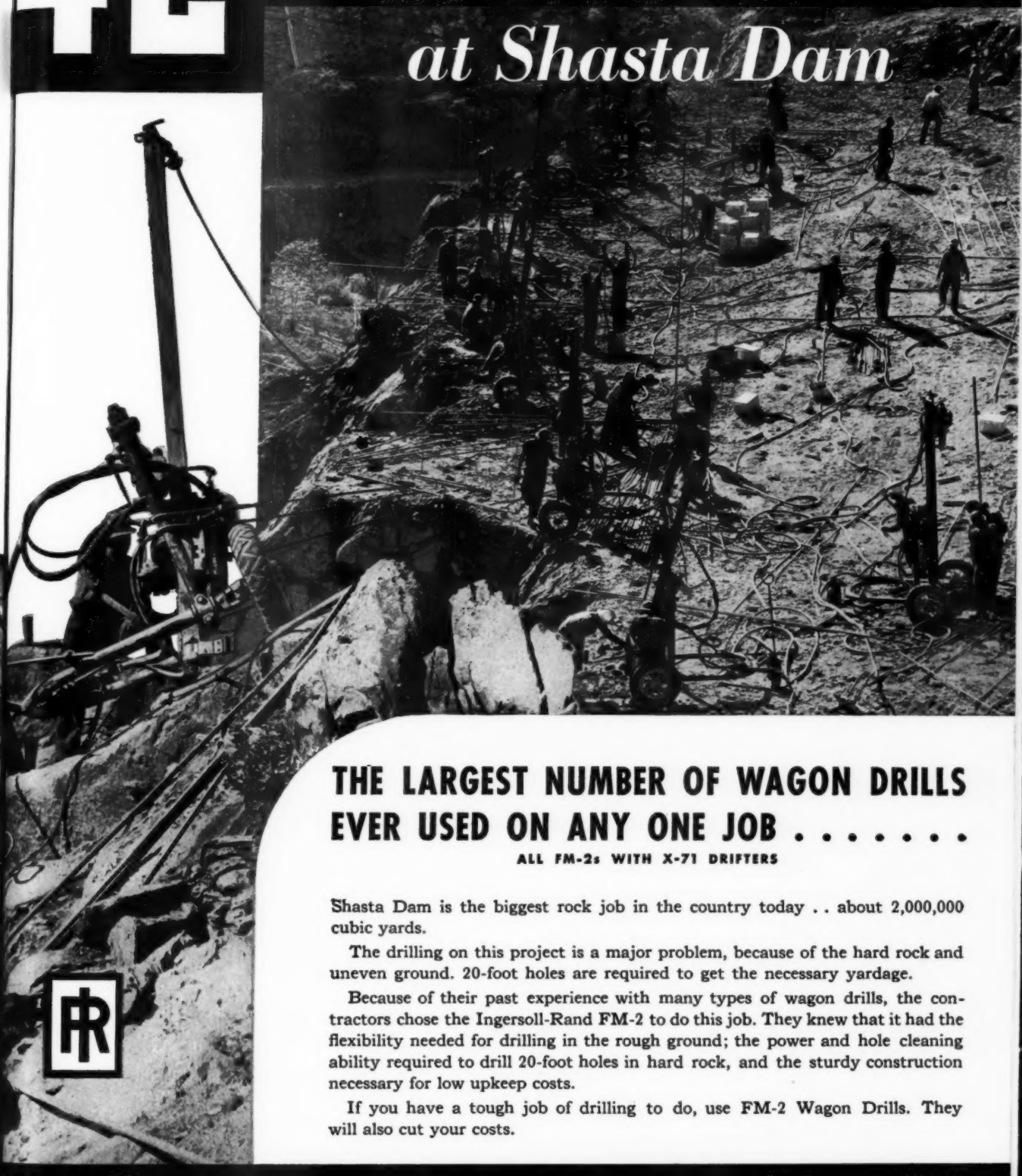
Drainage Ditches Prevent Waste

A large drainage ditch on the spoil bank side of the cut and a smaller ditch on the side where the bentonite is loaded proved to be a great aid in keeping water and overburden from washing back on the bentonite bed. Both of these ditches were dug by the 10-B.

Hauling of the bentonite has been sub-contracted to C. P. Gray, Polkville, Mississippi who has a fleet of 12 one and one-half ton Chevrolet trucks on the job. These

(Continued on page 417)

42 INGERSOLL-RAND WAGON DRILLS at Shasta Dam



THE LARGEST NUMBER OF WAGON DRILLS EVER USED ON ANY ONE JOB . . . . . .

ALL FM-2s WITH X-71 DRIFTERS

Shasta Dam is the biggest rock job in the country today . . about 2,000,000 cubic yards.

The drilling on this project is a major problem, because of the hard rock and uneven ground. 20-foot holes are required to get the necessary yardage.

Because of their past experience with many types of wagon drills, the contractors chose the Ingersoll-Rand FM-2 to do this job. They knew that it had the flexibility needed for drilling in the rough ground; the power and hole cleaning ability required to drill 20-foot holes in hard rock, and the sturdy construction necessary for low upkeep costs.

If you have a tough job of drilling to do, use FM-2 Wagon Drills. They will also cut your costs.

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Ingersoll-Rand

11 BROADWAY, NEW YORK, N.Y. 773-S

Shots from the Firing Line

(Continued from page 405)

which he expects to spend part of the 1939-40 flood control appropriation, which has passed the House and is waiting action in the Senate.

The reduction in height, presumably a result of local protests as to the amount of land to be inundated by the reservoir, reduces the amount of railroad relocation to 28.5 miles instead of 64.03. The reservoir area at the revised spillway height will be 127,000 acres, of which 35,900 will be in Texas and 91,700 in Oklahoma. The total storage below the spillway crest will be 5,825,000 acre-ft., of which 2,060,000 will be devoted to power regulation, dead storage will take 1,020,000, and the remainder will be devoted to flood control. An additional 758,000 acre-ft. of storage is available with a 5-ft. surcharge above spillway level.

The reservoir is designed completely to control the record flood of 1908 with a peak discharge of 470,000 sec.-ft. The spillway is designed for a peak outflow of 750,000 sec.-ft.

The dam is to be a rolled earth fill 14,000 ft. long with a top width of 40 ft., maximum base width of 1,145 ft. and volume of 15,475,000 cu. yd. The imperivous upstream section will have slopes ranging from 1 on 2.5 to 1 on 4; downstream slopes will be 1 on 2 and 1 on 3.

● **This Rex 27E Paver laid 2100 feet of concrete, 10.7 inches deep and 10 feet wide, in eight hours on a highway widening job near Spokane, Washington. Chas. A. Rower was the contractor.**

Lake Forms at Grand Coulee

A 25-mile lake has already formed behind partly-finished Grand Coulee Dam, on the Columbia River in Washington, according to a report by government officials.

The lake is 100 feet deep, at the dam site. It will take many months to reach its full size of 375 feet deep and 151 miles long, growing as the dam rises.

A fleet of boats of all kinds and sizes is already on the lake. It is expected by next summer that the lake will be twice as deep and long.

Construction on the central spillway section of the dam has been temporarily suspended for the high water season of the summer. Concrete placing in the section will be resumed in the fall.

Announce Mine and Quarry Safety Awards

Notable records achieved by mines and quarries in the prevention of accidents among mineral workers were recognized in the announcement of the winners in the National Safety Competition of 1938 made recently by Dr. John W. Finch, Director, Bureau of Mines, Department of the Interior.

Three hundred and forty-five mines and quarries operating in 37 States participated in this, the 14th, annual safety contest conducted by the Bureau of Mines.

Four underground mines, one open-cut mine and one quarry, each a leader in its group, were awarded the "Sentinels of Safety" trophies, donated by the Explosives Engineer magazine. Relative standing in the contest was based on the number of days lost from accidents in proportion to the total number of man-hours worked.

Three bituminous-coal mines, 12 nonmetal mines, 4 metal mines, 78 quarries and 16 open-cut mines were operated during the contest year without a lost-time injury to any of the employees.

The six groups comprising the con-

"Without question the best Bucket we ever used"
And when a Haiss bucket licked this dredging job for a bridge pier foundation where others had failed—enough said.
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"The fastest, most economical machine we have ever owned,"

Says **J. L. Crittenden, Supt., Domingos Construction Co.**

Mr. Crittenden has had this ¾ yard 10-B dragline stripping and loading bentonite clay since February 1936, so he can speak with authority. This 10-B is diesel powered and is running on an average fuel cost of 35 cents per 8-hour day — (five gallons of 7-cent fuel oil) — just 4-3/8 cents per hour! Another thing Mr. Crittenden likes is the ease with which the 10-B handles and moves around to do the 'handyman' jobs in the quickest, easiest way. Let us show you how this fast modern machine can be applied on your excavating to increase your profits!

Weighs 8½ to 9 tons; Travels 4¼ miles per hour; Steers like a tractor; Power 38 to 56 H.P.; Swings 5 r.p.m.; Hooked Conical Rollers (no center pintle); Twin, positive rope crowd; 28 Ball and Roller Bearings; Automatic Lubrication.

AT-46

Bucyrus-Erie

SOUTH MILWAUKEE BUCYRUS ERIE WISCONSIN

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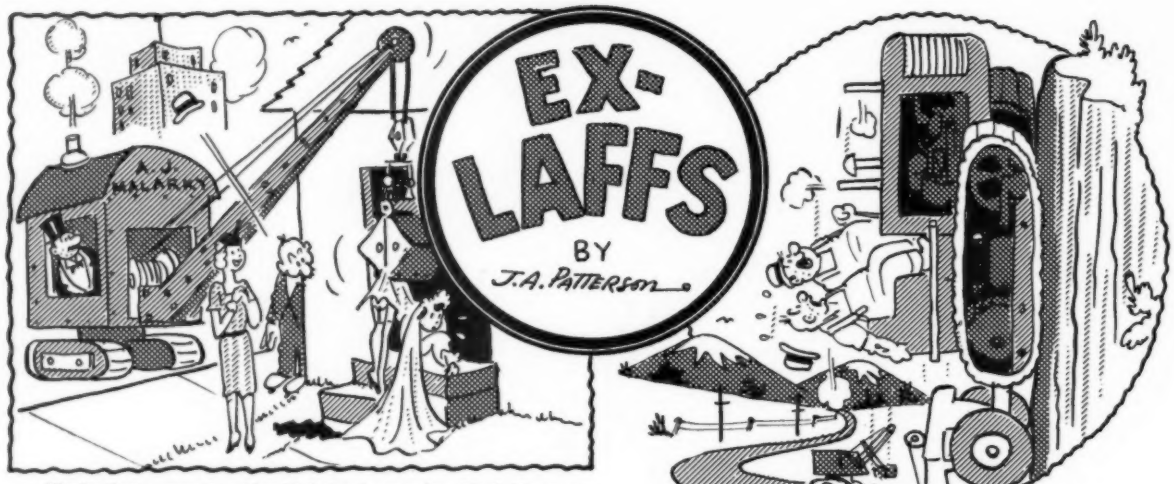
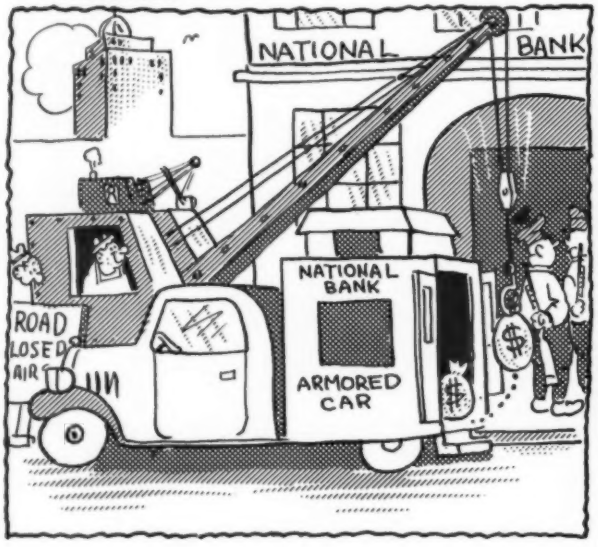
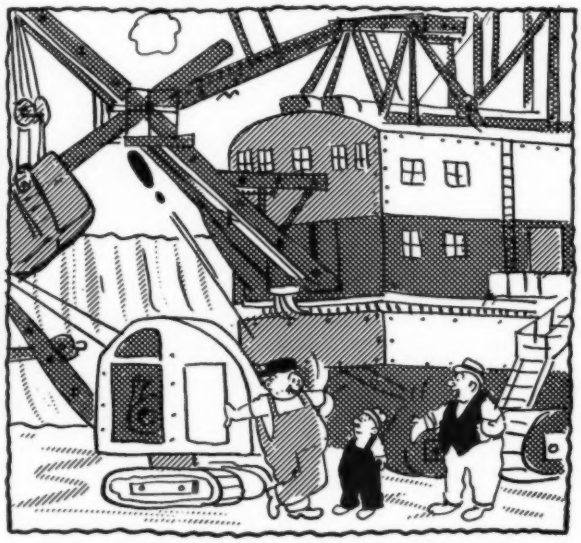


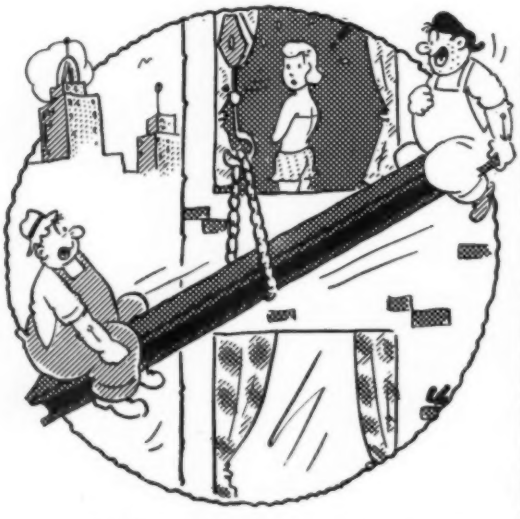
"Isn't that romantic—Mr. Malarky is carrying his bride over the threshhold!"

"I'm suprised myself, this isn't a claim we usually make for our tractors!"

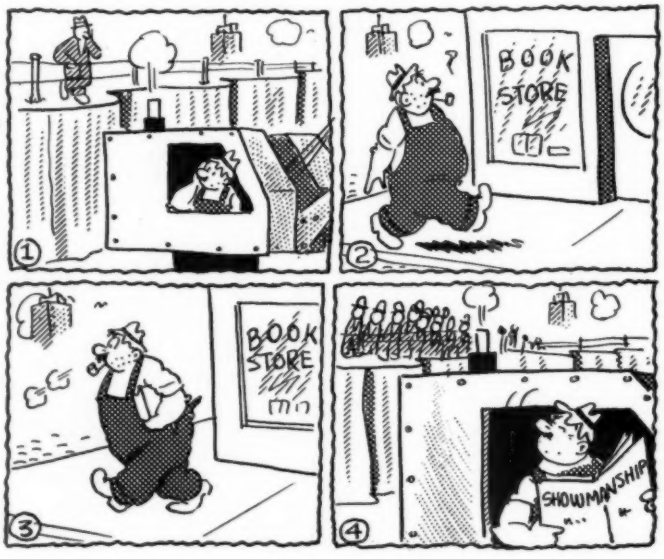




"This is Mr. Mendolson, Joe, he'll operate the stripper!"



"Why do you keep singing—'See Saw I saw Marjorie Daw' you dope?"



test were: Anthracite mines, bituminous-coal mines, metal mines, nonmetallic-mineral mines, open-cut mines, and quarries.

The trophy for anthracite mines was won by the Greenough mine near Natalie in Northumberland County, Pennsylvania. This mine was operated by the Colonial Colliery Company. During a period of 223 days in 1938 the mine worked 319,035 man-hours with 11 lost-time accidents causing 285 days of disability. The accident-severity rate was 0.893.

In the bituminous-coal group, the trophy was awarded to the "B" mine of the Union Pacific Coal Company near Superior, Sweetwater County, Wyoming. During the year 1938 it was worked 243,094 man-hours without a lost-time accident. This record was made by 189 employees working 246 days.

The Cary iron-ore mine of the Odanah Iron Company near Hurley, Iron County, Wisconsin, was awarded the metal mine trophy for working 168,703 man-hours in 316 days without a lost-time accident.

The winner of the trophy in the nonmetallic mineral mine group was the Avery salt mine of the Avery Salt Company at Avery Island, Iberia Parish, Louisiana. This mine worked 272,766 man-hours in 310 days without a lost-time accident.

The trophy for the group of open-cut mines was awarded to the Mahoning iron-ore mine of Pickands, Mather & Company near Hibbing in St. Louis County, Minnesota. This mine was operated 282,258 man-hours in 1938 without a lost-time accident.

In the quarries, the winner was the Port Inland limestone quarry, operated by the Inland Lime & Stone Company. The quarry is located in Mackinac County and the crusher in Schoolcraft County, Michigan. This quarry worked 299,751 man-hours in 206 days without a lost-time accident.

To Vote Against Highway Fund Diversion

Constitutional amendments to prohibit the diversion of motor-vehicle revenues to non-highway purposes will be voted on in at least three states at 1940 general elections, according to a recent report of the Committee on Diversion of the American Road Builders' Association, Washington, D. C. The necessary steps for placing anti-diversion amendments on the ballot have been taken by the legislatures of Idaho, Nevada and South Dakota. Such amendments have already been adopted by overwhelming majorities in California, Colorado, Kansas, Michigan, Minnesota, Missouri and New Hampshire.

The ARBA committee also reports that motorist groups are hopeful that public voting on amendments will be provided for by the legislatures now in session in Connecticut, Delaware, Maryland, Massachusetts and Wisconsin. It is further believed that the Alabama legislature will give the proposal favorable consideration during a special session this summer.

The highway-user organizations supporting the proposed amendments believe that there is a particularly strong chance for their adoption. The voters have never turned down an opportunity to confine highway funds to highway improvement, except in cases where other issues were involved in the proposal.

Motorist groups in Oregon are at present considering using the petition method for placing an anti-diversion amendment on the ballot. Oregon initiated the gas tax just twenty years ago and it is probable that the citizens of that state would approve an amendment by a very large majority.

Numerous public leaders have condemned the misappropriation of highway funds to purposes unrelated to highways on the grounds that it imposes unfair double taxation on highway users. It is estimated that diversion in some three dozen states is robbing highway construction of from $160,000,000 to $170,000,000 every year, with a consequent loss of highway employment for about 170,000 workers.

The urgent need for safer roads is emphasized in the report of the ARBA Diversion Committee which quotes a

RESEARCH

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Use "HERCULES" (Red-Strand) on your next job. It's made of acid open-hearth steel wire, correctly designed and manufactured according to advanced production methods to give you long, safe and economical performance.

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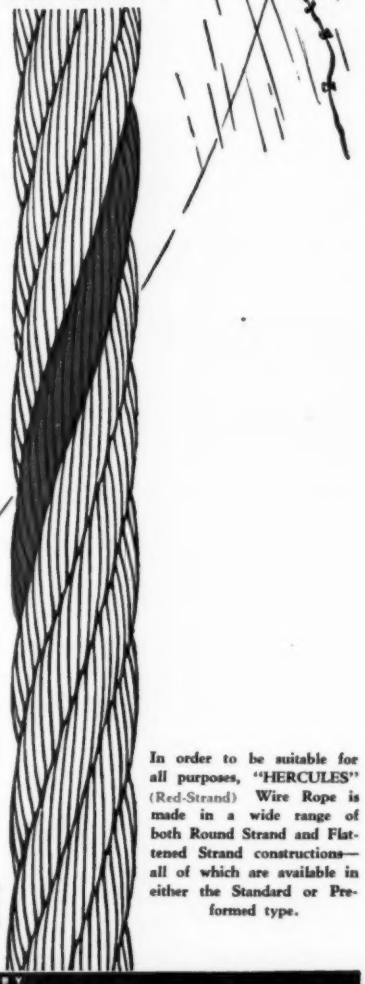
ELASTICITY
FLEXIBILITY
TOUGHNESS
DURABILITY

Benjamin Franklin's research in electro-physics, chemistry, medicine, meteorology and geology led him to new discoveries which greatly advanced civilization.



In order to be suitable for all purposes, "HERCULES" (Red-Strand) Wire Rope is made in a wide range of both Round Strand and Flattened Strand constructions—all of which are available in either the Standard or Preformed type.

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statement recently made by President D. D. Fennell of the National Safety Council, "We can never have safety on our highways until we have safe highways. We can never have safe highways unless we dedicate to that sole purpose every penny of every highway dollar."

Quebec Launches Highway Program

A road building program for Quebec, Canada amounting to $18,000,000, of which $6,000,000 will be for new highways has been announced by the Hon. Anatole Carignan, Minister of Highways for the Province of Quebec. It is reported that the work is to start immediately.

U. S. Building Four Largest Concrete Dams

With the recent Congressional approval of $5,000,000 to continue construction work on Marshall Ford Dam in Texas, the Bureau of Reclamation will have built or have under construction the four largest concrete masonry dams in the world, according to government reports.

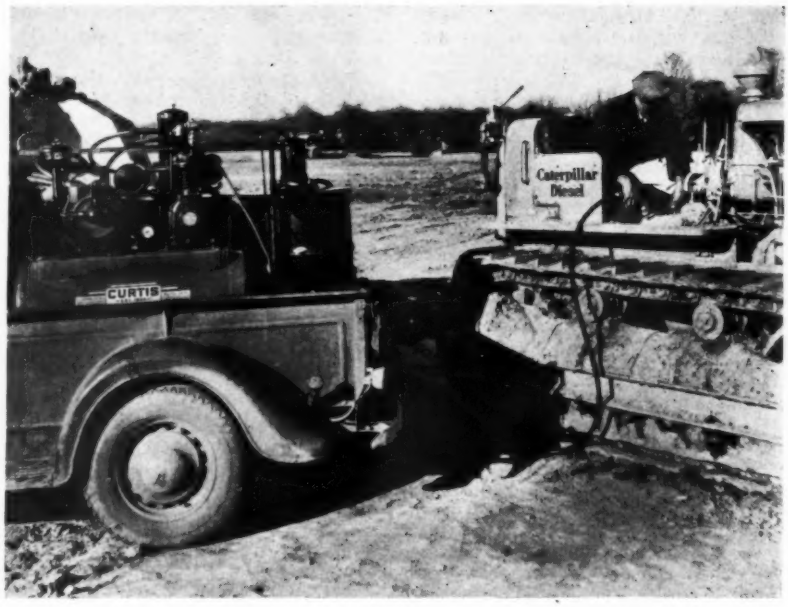
The added funds will make it possible to continue construction of Marshall Ford Dam toward its full height of 270 feet which will require the placement of 1,868,700 cubic yards of concrete. It will be fourth largest, ranking after Grand Coulee Dam in Washington, Shasta Dam in California and Boulder in Nevada-Arizona.

The fifth largest dam in the world is the Mettur in India. It contains 1,850,000 cubic yards of masonry. Wilson Dam, at Muscle Shoals, Alabama, follows with 1,400,000 cubic yards.

Grand Coulee will have 10,200,000 cubic yards of concrete, Shasta 5,400,000. Boulder Dam, already complete and the highest in the world, has only 3,250,000 cubic yards of concrete in its construction.

The four dams between them will require the placement of more than 20,000,000 cubic yards of concrete masonry. Placed in a tower the size of a city block, this masonry would extend a mile and a half into the air.

The four dams will require 22,000,000 barrels of cement. The cement alone weighs 4,136,000 tons.



● A portable Alemite plant services a Caterpillar tractor. On-the-job servicing of this type is gaining wide favor on large jobs.

Government Appropriations

Actual estimates and appropriations now before Congress reveal that a total of at least $2,002,573,826 will be spent during the fiscal year beginning July 1 in support of activities by and for the Army, Navy and Marine Corps, and their components, and the Coast Guard and Civilian Conservation Corps, aggregating 1,200,990 officers and men. In addition, there are before Congress authorization bills under the President's National Defense Program totalling $770,772,000 and providing personnel increases. Thus, this Congress will supply approximately $2,773,345,826 for the agencies mentioned above.

Ben B. Shaw

Ben B. Shaw, manager of the Georgia Kaolin Company's plant at Dry Branch, Georgia, died in a Macon, Georgia, hospital on June 3, at the age of 53. He had been suffering with a heart ailment for three days.

Mr. Shaw, a graduate of the University of Illinois, and a native of Canton, Illinois, had been in charge of the Georgia Kaolin Company's plant since 1934 which, at the time of his death, employed 300 men.

Big Savings
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Crescent Scraper hauls 40 loads of gravel per hour from high hill to crusher.

Sauerman Cableway digs clay and delivers to car hopper on track above pit.

MORE contractors are proving every day that Sauerman machines make easy work of many excavating problems that would be complicated and costly by any other method.

Wherever earth is to be moved any distance beyond the reach of a boom or dipper-stick, a Sauerman machine has an advantage because it is able to dig, haul and place the material in a straightline operation, doing away with the expense of rehandling.

The equipment investment generally is less, the operating expense always less—when a Sauerman machine is used for these long range jobs.

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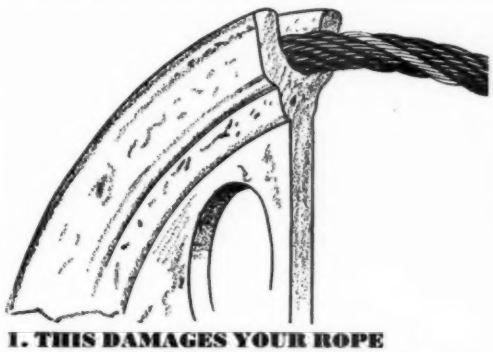
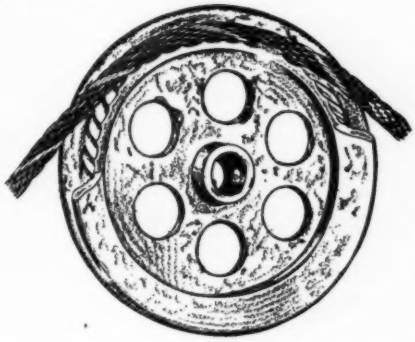
HOW SHEAVE MATERIALS AFFECT WIRE ROPE SERVICE

No. 2 in a series of informative articles for wire rope users, prepared by the MACWHYTE *wire rope company*

WATCH YOUR SHEAVES! *And Get Longer Wire Rope Service*

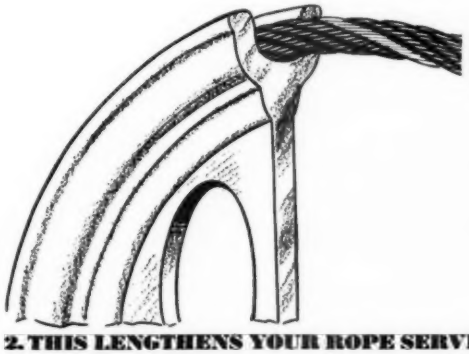


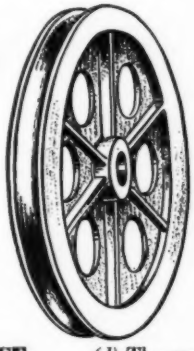


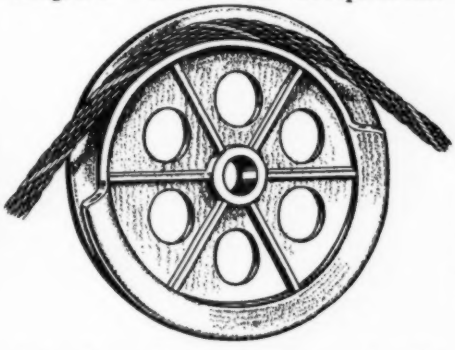
1. THIS DAMAGES YOUR ROPE

(a) Deep scoring of soft sheaves, pinch the rope and cause it to scrub on sheave flange.

(b) SOFT SHEAVE often corrugates. A new rope does not "track" in the corrugations — Result — less wire rope service.







2. THIS LENGTHENS YOUR ROPE SERVICE

(c) A hard sheave does not easily score deeply and damage the rope.

(d) The smooth wearing surface of a hard sheave gives the rope a smooth bearing surface that lengthens the life of both sheave and wire rope.

NOTE: *Tear out . . . put in your wire rope maintenance file*

3. IT IS FALSE ECONOMY to Operate Wire Rope Over Badly Scored and Corrugated Sheaves. WATCH YOUR SHEAVES . . . Keep Them Smooth . . . And Get Longer Wire Rope Service! The benefit of our experience on any problem pertaining to wire rope and its use is yours for the asking. It is part of our friendly service.

Contradictory as it may seem, a *soft* iron sheave that wears rapidly will cause more wear on a wire rope than sheaves made with *harder* materials.

Why Soft Sheaves Cause More Wear on Wire Rope.

A sheave of softer material than the wire rope is likely to take an impression of the wire rope and become deeply scored and corrugated, presenting a ragged surface which damages the rope and causes excessive wear.

A NEW WIRE ROPE USED ON A CORRUGATED SHEAVE WILL NOT "TRACK" IN THE CORRUGATIONS MADE BY THE PREVIOUS ROPE. IT WILL WEAR RAPIDLY AND NOT GIVE MAXIMUM SERVICE. THE GROOVE WILL ALSO WEAR DEEP AND THE FLANGE OF THE SHEAVE WILL CAUSE EXCESSIVE WEAR.

Why Hard Sheaves Increase Wire Rope Service.

Sheaves made of harder materials...such as carbon steel, manganese, other alloys, or "work-hardening" steels . . . wear smooth, last longer and allow the rope to give the best service.

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Field Notes

(Continued from page 400)

to be understood as meaning that where an excavation contract is entered into and the owner fails to secure a necessary building permit, the excavation contractor is necessarily without any legal remedy. In such case, should the contractor be prevented from legally proceeding with the performance of the contract, because of the owner's neglect or failure in this respect, it would seem that the contractor would have a valid claim for damages against the owner, assuming that the contract work was of such character that a permit would properly issue on proper application being made by the owner. However, if the law should forbid issuance of the permit, it would appear to be equally clear that no damage claim could be enforced, because the contract would be irredeemably illegal. The court distinctly decides that no lien can be enforced for doing work performed without a permit being obtained.

● A handy, and sanitary way of keeping a bucket off the ground around the field repair shop and cook shack.

Handy, Sanitary Wall Pail Holder

Because of their shape and construction common sheet iron water pails are not an easy thing to hang or suspend in such a manner that they will quickly drain and dry out. Hooks and arms of some kind are often used, but they are awkward affairs and usually in the way.

A neat and very handy arrangement for hanging pails is shown in the illustration. A knob, spool, or even a staple driven in at a slight angle will do to put one edge of the pail rim over against the wall. Fashion a sim-

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ple hook out of wire, spreading the hooks or points at a sharp angle and some two or three inches apart as shown. Before closing the neck of the hook arrangement, run it through an eye on one end of a small piece of chain, just long enough to tip the lower rim of the bucket or pail about an inch away from the wall or post. Fasten the upper end of the chain with a small nail or staple.

Suspended or hung in this simple manner, a pail is neatly and securely held. It will drain quickly, yet not drip or run down the surface to which it is attached. When not in use, the small chain and hook drop down and lay out of the way against the wall. No arms, hooks or projections to run into.—*Frank W. Bently.*

Hot Weather Hints

Heat exhaustion and sunstroke are two entirely different things, even though both may seem to result from the same cause—exposure to high temperature.

Even though some of us may not remember which is which, we cannot fail to remember a part of the treatment that is extremely simple. Briefly, it is this: If the patient is cold, make him warm; if he is hot, make him cool.

HEAT EXHAUSTION

How To Tell It

Skin cold and clammy.
Face pale.
Dull headache
Dizzy feeling.
Person may vomit.

What To Do

Call a doctor.
Keep warm with blankets.
Give hot coffee or aromatic spirits of ammonia in water.
Lay flat on back with head low.
Loosen clothing.

SUNSTROKE

How To Tell It

Skin hot and dry.
Face red.
Shooting headache.
Delirious.

What To Do

Get him cool.
Dash cold water on face and chest.
Use water hose on chest if hose is available.
Put ice on head.
Have patient drink lots of cold water—not ice water.
Place in semi-sitting position.
Strip to his underclothes.

National Safety Council.

Mining Bentonite

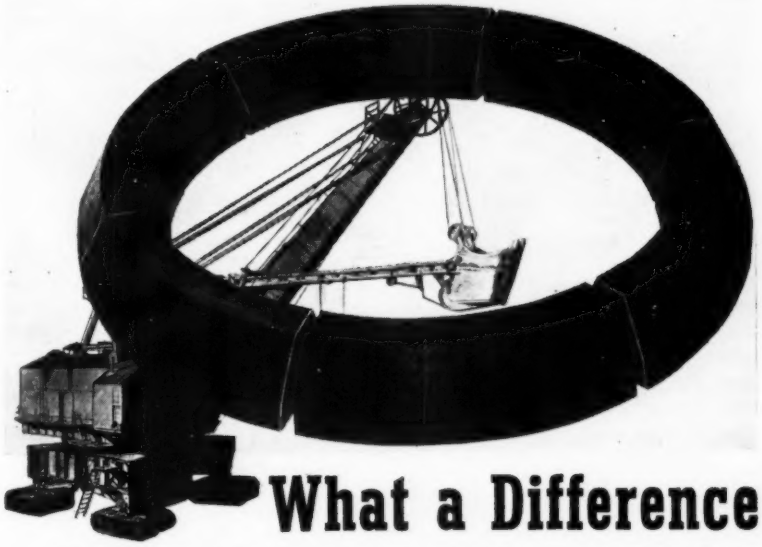
(Continued from page 408)

trucks, equipped with dump bodies and built-up sides, average about 4½ tons per load for the 18 mile haul over sand and clay road to Morton, Mississippi. The trucks are equipped with extra heavy springs and are traded in for new ones every 12 months.

Because of the great amount of rain in this area, all roads to the mine have been gravelled. In extreme wet weather a board road, built in sections, is used on the mine floor. The sections are moved as each cut is completed.

Shipping the Bentonite

The other end of the 18 mile haul is the loading ramp at Morton. This ramp is 80 feet in length and is parallel to the railroad tracks. Fill for the ramp was handled by the 10-B before it was taken to the mine. Constructed of heavy timber and creosote piles that are cable-anchored to "dead men" buried in the ramp, the



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platform is sturdily and conveniently constructed. Approaches to the ramp are well gravelled.

Upon reaching the top of this platform, the trucks turn around and back to the edge of the ramp and dump direct to railroad cars on the Yazoo & Mississippi Valley railroad line which is a part of the Illinois Central system. Total unloading time is about two minutes. Then the bentonite is on its way to a plant in Jackson, Mississippi for processing and treating in preparation for use at various oil refineries.

Digging Ditches

(Continued from page 387)

ease of which Mr. Stockwell adapted himself to his new job as he certainly performed a good dragline job on this project.

About 50,000 Yards Moved

Approximately 50,000 yards of gravel, sand and loam were excavated and piled along the stream banks for further levee building work. Parts of the stream revision called for an entirely new channel while the balance of the work consisted of widening and straightening the old channel.

● Excavated material was piled along the stream banks for further levee building work.

In working along the soft shoulders of the stream bank, Mr. Raab found it advisable to use large plank mats to insure an even, solid footing for the dragline.

The new ditch has been widened from its old width of 15 to 20 feet to a uniform width of 40 feet. The channel is now 10 feet deep with a slope of one and one-half degrees.

The cost of this project ran about $3,000, and for this comparatively small sum the city of Lancaster has freed itself from the ever present flood danger of Baldwin's Run.

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in used excavating equipment
(taken from page 423)

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For other bargains in shovels, draglines, cranes, locomotives, trenchers, and miscellaneous contractors' equipment turn to pages 422 and 423.

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Rene Brunner

COMING as a shock to the entire French heavy machinery industry was the sudden death of Rene Brunner in Paris, France, on May 11th, 1939.

Born of Alsatian parents in Strasbourg, France, in 1883, M. Brunner's early education was climaxed by the completion of his courses at the l'Ecole Centrale des Arts et Manufactures of Paris from which he graduated in 1907.

During the years preceding the Great War, M. Brunner completed his theoretical training in participating in the study of and work on several large public works contracts which he followed through to their completion.

He served in the French army from 1914 to 1919 as an officer of the artillery and fought during the war with such valor that he was first decorated with the Croix de Guerre and then with the order of the Legion of Honor.

After his demobilization in 1919, he went into partnership with Emile Marchand and founded Brunner and Marchand, a company whose principal business was

the supplying of machinery for construction of various public works. At present Brunner and Marchand represents Bucyrus-Erie Company, Ruston-Bucyrus Limited, and Allis Chalmers Company for the distribution of their products in France and the French Colonies.

During his life, Rene Brunner was a consultant on some of the largest public works contracts carried on in France and in the French Colonies, and because of his long experience and his profound practical knowledge in this line, he was called upon to supply the heavy earth-moving machinery for a very great number of these contracts.

Because of his numerous excellent relations with the managing and operating personnel of these jobs and because of this high technical and business standards which he brought to this work, M. Brunner never failed to enjoy, with the highest authorities on these French contracts, personal relations of such sincerity that he counted all these people among his sincerest friends.

His premature and unforeseen death will long be felt, particularly by his numerous colleagues to whom his devoted services had endeared him. M. Brunner is survived by three daughters and a son. It is hoped that the latter will now be able to continue the remarkable accomplishments of his father.

Trade notes

Wisconsin contractors and industries are to have a new source for graded and washed limestone in the newly incorporated Inland Lime and Stone Company of Wisconsin. The new company has leased dock space on the Menominee River in Milwaukee. The Inland Lime and Stone Company is a subsidiary of the Inland Steel Company, one of the country's largest independent steel producers. Charles H. Weymier, Assistant Sales Manager, will be in charge at the Milwaukee Plant.

The John A. Roebling's Sons Company of Trenton, New Jersey, manufacturers of wire and wire rope, insulated wire and cables and wire cloth and netting, announces the appointment of Earl N. Graf as manager of its Pittsburgh, Pennsylvania Branch located at 855 West North Avenue.

The Cummins Diesel Sales Corporation of Illinois, with offices at 1935 S. Indiana Avenue, Chicago, announces the appointment of Leonard W. Beck as manager. Appointment of Mr. Beck completes the reorganization of the Illinois territory which the Cummins Engine Company, of Columbus, Indiana, will in the future operate as a factory branch, succeeding the Cummins Diesel Sales and Service Company of Illinois as authorized sales and service representatives for Cummins Diesel engines.

As the result of a recent Stewart-Warner appointment, C. A. Fine has returned to Los Angeles and is in charge of the Alemite Company of Southern California. The Stewart-Warner Accessory Division announced that the new expanded territory of the Steifvater Electric Co., Inc., Utica, New York, covers 13 counties in Central New York state and includes the cities of Utica, Syracuse, Binghamton and Watertown.

The Worthington Pump and Machinery Corporation announces the election of Clarence E. Searle, of Bronxville, New York, and Hobart C. Ramsey of Short Hills, New Jersey, to the Board of Directors. It is also announced that Edwin J. Schwanhausser has been elected a Vice-President of Worthington. As Vice-President and Works Manager he will continue in his present responsibilities concerned with the development and manufacture of Diesel and gas engines, air, gas and refrigeration compressors at the Buffalo Works.

Book reviews

International Harvester has developed a simple industrial power cost record book that enables the tractor and power unit owner to obtain without much extra labor an accurate and comprehensive statistical picture of how his power equipment is operating and how much each tractor and each stationary engine is costing. For use with this book a printed form to be filled in daily by the tractor or engine operator has also been devised, and both these drivers' daily report forms and cost books are available free of charge to owners whether they operate International equipment or not.

The Rawlplug Company, Inc., 98 Lafayette Street, New York, New York has just issued a 38 page Hand Book "A Better Anchorage for Bolts and Screws." Copies sent upon request.

Listing twelve applications and explaining actual field methods, the new Koehring Mud Jack bulletin contains helpful information for municipalities, counties, industrial plants and private contracting companies. The Model Fifty Mud-Jack, for concrete highways and

(Continued on page 422)

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2½ yd. Special Shallow Dipper, 50-B, 52-B, 55-B. New	D-89
2½ yd. 55-B Dipper. New	D-91
3½ yd. Coal Dipper, 75-B. New	D-81
6 yd. Two part teeth, 200-B, 320-B, 225-B. New	D-11
8 yd. Two part teeth, 320-B Dipper. Used	D-6

Asterisk (*) denotes more than one such item available.

BUCKETS

DRAGLINE

1½ yd. Beco "AX," 3,200 lbs. Rebuilt	DB-37
1¾ yd. Beco "U," 3,250 lbs. New	DB-35
6 yd. Monighan "W," 12,500 lbs. New	DB-17
7 yd. Monighan "W," 13,700 lbs. New	DB-18
5 yd. Monighan, heavy duty, 10,000 lbs. Used	DB-16

CLAMSHELL

2 yd. PF Williams clamshell bucket without teeth and counterweight	CSB-1

DIPPER TRIPS

31-B steam dipper trip. New	DT-2
*42-B and E-2 dipper trips	DT-3
D-2 Erie type dragshovel dipper trip	DT-4

BOILERS

44"x17', 75 h.p. locomotive, 125 lb. working pressure A.S.M.E. std. Will fit 68-C	B-13
36"x82½" vertical boiler for type A Bucyrus-Erie machine	B-14

AIR COMPRESSORS

Brand new Worthington-Metalweld—2 cylinder, 7"x6" vertical 162 cu. ft. air compressor	AC-3

Asterisk (*) denotes more than one such item available.

POSITIONS WANTED

Positions wanted advertisements will be run under this heading for 5 cents per word, minimum charge $1.00.
Advertisements for help wanted free of charge.

Address all box numbers c/o EXCAVATING engineer . . . . . at South Milwaukee, Wisconsin

EXPERIENCED OPERATOR

Operator with 17 years' experience running shovels, draglines, clamshells, cranes and pull shovels—gasoline, Diesel, electric and gas-air models. Experience covers mine stripping, dam work, road construction, tunneling and pipe-line work. Has worked as maintenance man over six machines. Prefers work on any type of large machine, any make or power. Will go anywhere; age 38; married. Can do own repair work and furnish best of references. Box 9136

CONSTRUCTION ACCOUNTANT

Iowa Commerce Graduate would like contacts for a position in the accounting field with large construction or equipment concern. Possesses a knowledge of construction activities. References. Box 9137

DRILL OPERATOR

Position wanted as blast hole drill, pneumatic drill or compressor operator. Prefers to work on Bucyrus-Armstrong rig. Willing to go anywhere in U. S. or districts in Canada or Mexico suitable to bring family. Ex-service man, now working temporarily. Located State of Washington. Box 9138

MASTER MECHANIC

Fully experienced Master Mechanic, can take complete charge of Diesel, electric or gas excavators. Willing to acquire interest in company. References. Box 9131.

DRILL OPERATOR

Middle-age Blast-hole, Well Driller. 10 years' experience. Handle any type machine, do own repairs. Single, willing to go anywhere in U. S. Excellent references. Box 9132

EXPERIENCED OPERATOR

Fifteen years' experience open pit iron and coal mines; placer gold mining; flood control, irrigation dams, canals and levees; river and harbor dredging; railroad and highway construction; steel setting and piling work. Shovel, dragline or crane—electric, Diesel, gas or steam power; barge, rail, walker or crawler types—⅜- to 30-yards. Excellent references. Box 9130

EXPERIENCED OPERATOR

20 years' experience in construction work operating Bucyrus, Marion and Osgood standard and revolving steam shovels; P&H and Koehring gas shovels. Also 6 years as foreman on road, quarry, stripping and portable crushing plants. Do all repairing; electric and acetylene welding. Age 43, married. Now located in Middle West. Box 9134.

OPERATOR

20 years' experience, dragline clamshell and shovel. Steam, gas or Diesel. Can do own repair work. Will go anywhere for steady work. Box 9135.

Book Reviews

(Continued from page 419)

other large areas of concrete slab, and the Model Ten Mud-Jack, for concrete curb and gutter, sidewalk, street, alley, driveway and other small areas of concrete slab, are profusely illustrated with actual field shots. Diagrams and drawings show best methods for raising dips in pavement, sidewalks and other places where concrete is to be raised. Write to Koehring Company for your copy.

Mechanical features of the "Caterpillar" Diesel D7 Tractor are shown in a new booklet just issued by Caterpillar Tractor Company. Particular emphasis is placed on the four-cylinder Diesel engine that powers the machine. Cutaway photographs trace the path of fuel from the storage tank to the cylinder; and detailed pictures show the construction of injection valves, injection pumps, crankcase, cylinder heads, pistons, etc. The booklet may be obtained by writing Caterpillar Tractor Company, Peoria, Illinois, and requesting Form 5330.

Current interest in the Diesel engine is given educational aid by an illustrated booklet, "Dodge and Diesel." Free copies will be mailed to any one writing to the Truck Sales Department, Dodge Division, Chrysler Corporation, Detroit. The text presented in "Dodge and Diesel" explains and drawings illustrate what the Diesel engine is and how it operates as compared with the conventional gasoline engine.

Containing suggestions for rehandling bulk materials such as sand, gravel and crushed stone, the new bulletin just published by the Hayward Company, 50 Church Street, New York, New York, contains information on modern Hayward Class "E-16" Clam Shells. Designated as Bulletin No. 696, this latest bulletin is fully illustrated. It shows buckets for use on all types of operating machines. It illustrates Hayward Class E-16 Buckets of all sizes, from ½ cubic yard up, suitable for rehandling both light and heavy materials. Copies will be mailed to all interested.

Schramm, Inc., air compressor manufacturers, West Chester, Pennsylvania, are distributing a new 22 page catalog which presents their complete line of "Utility" Portable Air Compressors. Sizes from 85 to 420 cu. ft. capacity are listed, available with either gasoline or diesel engine power.

The revised and enlarged 2nd edition of the book "Engineering Terminology" by Brown & Runner has been prepared for every engineer who finds himself occasionally confronted by a term which is in use in one part of the field but which conveys no exact meaning to his mind. This book defines the accepted meaning of a word or phrase as used in fields including highways, streets, sewerage, geology, structures, railways, etc. A copy may be had for $4.00 from the Gillette Publishing Company, Chicago, Illinois.

A new folder describing the use of Carpenter Centrifugal Driers in all industries where there are granular materials to be dried, has just been issued by Koppers-Rheolaveur Company, Pittsburgh. The company also has issued a leaflet concerning Koppers wedge-wire screens for the removal of free moisture from fine material. Copies can be had upon request.

The International Nickel Company, Inc., New York, announces the release of the latest edition of Bulletin T-13, "Nickel and Nickel-Base Alloys . . . Their Use in the Design of Corrosion-Resistant Machinery and Equipment," which carries many changes from the preceding one. The text has been enlarged and, for some sections, rewritten extensively; and the tables and curves revised to include the latest available information. Additions have been made to Tables I and X to include data on the new alloys, Hastelloy B and Illium R. Tables XI and XVII are brought to date to record the corrosion rates of Nickel and Monel after five year atmospheric exposure tests. The curves of Figures 23 and 24 have been redrawn and extended.

Outdoor oil circuit breakers for framework or pole mounting, manually or electrically operated, are described in a new leaflet released by the Westinghouse Electric & Manufacturing Company. The breakers are multiple-tank; one, two, three or four pole, single throw. Types discussed in this illustrated pamphlet are: 50,000 kva, 15 kv, 600 amperes; 100,000 kva, 15 kv, 600 amperes; 250,000 kva, 15 kv, 600 and 1,200 amperes; and 250,000 kva, 23 kv, 600 amperes. Copies of Descriptive Data 33-745 may be secured from department 7-N-20, Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pennsylvania.

The Chicago Eye Shield Company, 2300 Warren Blvd., Chicago, Illinois, releases their 24th catalog, "Industrial Head and Eye Protection." The 48-page book lists a very wide and complete line of goggles, respirators, spectacles, masks, welding helmets and other safety devices. Besides regular product listings you will find general information on how non-shattering lenses are made; on pages 20 and 21 what a worker should wear and why, when exposed to ultra-violet and infra-red light rays; and of considerable importance, the table on page 31 showing what type of respirator is recommended for over 325 harmful gases, fumes, mists, and dusts.

The Hewitt Rubber Corporation, Buffalo, manufacturer of industrial hose, conveyor and transmission belting and molded products, has recently joined the ranks of those companies publishing house organs. Outstanding in its first or Spring issue is a complete listing, by name, of all Hewitt employees. The new magazine, it is stated, is designed to be a common "meeting ground" of company information, experiences, and enthusiasm. It is also designed to give all within our organization a working knowledge of the other fellow's job, duties, and responsibilities.

FOR SALE

RATES: 60c per line—minimum charge $2.40. Repeat insertions with no change in copy—three insertions for the price of two. ¶ Display advertising in this section at published display advertising rates. ¶ Estimate 41 characters per line, counting all spaces and punctuation as one character each. Allow ten characters for box number for blind advertisements. If address given, counts same as advertising copy. ¶ Rates are net (no commission, no discount) and payable in advance of publication. Send your remittance with insertion order and copy. ¶ Closing date—15th of preceding month. Example—January issue closes December 15.

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SMALL SHOVELS, CRANES AND DRAGLINES
Up to 2½ Cubic Yards

BUCYRUS-ERIE GA-2 GAS-AIR HIGH LIFT SHOVEL. Good operating condition. Located Eastern Pennsylvania. Box 2289

BUCYRUS-ERIE B-2 HIGH LIFT STEAM SHOVEL. Good mechanical condition. Located vicinity Boston. Box 2287

BUCYRUS-ERIE 34-B Combination Diesel shovel-dragline, 1½-yd. Used ten months. Overhauled since. Good as new. Located Kansas City, Mo. Box 2317

P&H MODEL 400 GASOLINE SHOVEL. Waukesha engine rebuilt late 1938. Machine generally good condition. Located Arkansas. Box 2285

BAY CITY GAS TRACTOR TYPE SHOVEL AND DRAGLINE—¾-swing. Fair condition. Located Pittsburgh. Box 2286